Appendix C

Ecological Screening and Data Gap Analysis

Appendix C

Ecological Screening and Data Gap Analysis

This appendix is presented in two parts: (1) Appendix C1 and (2) Appendix C2. Appendix C1, "Ecological Screening of Waste Area Groups 6 and 10 Sites," presents the results of the initial Waste Area Groups 6 and 10 ecological risk assessment site screening. Appendix C2, "Ecological Risk Assessment Data Gap Analysis Report," documents the status of the previously identified data gaps, identifies remaining and new data gaps that need to be addressed prior to the initiating the Operable Unit 10-04 Ecological Risk Assessment, documents the status of the waste area group-specific ecological risk assessment activities, and presents a review of agency and stakeholder comments and concerns. Appendix C2 also contains an attachment (Appendix C2 Attachment 1—Preliminary Summary of Waste Area Group Ecological Risk Assessment Results) that discusses the status of the Phase I and II ERA process at each WAG and summaries the preliminary results.

Appendix C1

Ecological Screening of Waste Area Groups 6 and 10 Sites

CONTENTS

TABLES

ACRONYMS

AEF	Argonne Experimental Facility
ANL-W	Argonne National Laboratory-West
APPR	Army Package Power Reactor
ARVFS	Army Reentry Vehicle Facility Site
BORAX	Boiling Water Reactor Experiment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	contaminants of potential concern
D&D	decontamination and dismantlement
DF	Dairy Farm
EBR	Experimental Breeder Reactor
ERA	ecological risk assessment
EOCR	Experimental Organic-Cooled Reactor
LCCDA	Liquid Corrosive Chemical Disposal Area
NaK	Sodium - Potassium
NODA	Naval Ordnance Disposal Area
NTCRA	nontime-critical removal action
OMRE	Organic-Moderated Reactor Experiment
OU	operable unit
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
STF	Security Training Facility
TMP	tank management program
TPH	total petroleum hydrocarbons
VOC	volatile organic compounds

WAG	waste area group
WMO	Waste Management Operations

Appendix C1

Ecological Screening of Waste Area Groups 6 and 10 Sites

BACKGROUND INFORMATION

Available information from human health risk assessment activities for Waste Area Groups (WAGs) 6 and 10 sites was compiled, and the contaminants of potential concern (COPCs) were identified. These sites were then initially screened for ecological purposes using the following criteria:

1. The sites where no contamination has been detected were eliminated (no source)

2. The sites that have been cleaned up to a depth greater than 3 m (10 ft) and for which no contamination has been found in the surrounding area were eliminated (no pathway)

3. The sites that have no known contamination above 3 m (10 ft) were eliminated (no pathway).

Each site and site description for WAGs 6 and 10 is listed in Table C1-1 (Columns 2 and 3) along with the associated Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) assessment level (Column 4) and the justification for either retaining or not retaining the site based on the initial screening criteria. Those sites that have been retained for further analysis are identified with an "X" in Column 5 and are summarized in Table C1-2, which also lists the COPCs for each site.

Sites that were not screened are retained for further analysis in the WAGs 6 and 10 Ecological Risk Assessment (ERA).

Table C1-1. WAGs 6 and 10 operable unit sites and justification for ERA retention or elimination.

OU	Site	Site Description	Track[a]	In[b]	Justification
WAG 6					
None	EBR-01	Experimental Breeder Reactor (EBR)-I Reactor Building	D&D	X	The HTRE reactor components are still in place. D&D has not been scheduled.
None	EBR-02	(EBR)-I Septic Tank (AEF-702) and Seepage Pit (AEF-703)	NA		This septic tank and associated seepage pit were used to treat sanitary waste. There is no evidence of hazardous waste entering the system. Tank and pit removed. No source.
None	EBR-03	EBR-I Seepage Pit (WMO-702)	NA	X	D&D removed the pit in 1995. Radiological contamination was found at the base of associated EBR-04 tank excavation.
None	EBR-04	EBR-I Septic Tank (WMO-701)	NA	X	D&D removed the tank in 1995. Radiological contamination was found at the base of the excavation.
None	EBR-05	EBR-I Cesspool, Septic Tank (EBR-709), and Seepage Pit (EBR-713)	NA		This waste system was used to treat sanitary waste. There is no evidence of hazardous waste entering the system. There is no source.
None	EBR-06	EBR-I Septic Tank (EBR-714) and Seepage Pit (EBR-716)	NA		This septic tank and associated seepage pit were used to treat sanitary waste. There is no evidence of hazardous waste entering the system. The tank and pit were removed. There is no source.
6-01	BORAX-02	Boiling Water Reactor Experiment (BORAX) I Burial Site	RD/RA	X	Site was analyzed and remediated under WAG 5, Operable Unit (OU) 5-05/6-01 RI/FS. The data indicate there is radiological contamination.
6-02	BORAX-01	BORAX II through V Leach Pond	T1	X	The pond has been backfilled, but no contamination has been removed. It is identified as a subsurface radiological hazard.
6-02	BORAX-03	BORAX Argonne Experimental Facility (AEF) Septic Tank (AEF-703)	T1		This septic tank was used to treat sanitary waste. There is no evidence of hazardous waste entering the system. There is no source.
6-02	BORAX-04	BORAX Trash Dump	T1		This dump was used for debris resulting from construction, modifications, and overhauls of the experimental reactors. Asbestos was the only recorded hazardous waste. The dump was cleaned and backfilled by D&D. There is no source.
6-02	BORAX-08	BORAX V Ditch	T1	X	The contaminated soil was removed. The OU 10-06 NTCRA verification sampling and laboratory analyses indicated that the Cs-137 is over the background concentration.

Table C1-1. (continued).

OU	Site	Site Description	Track[a]	In[b]	Justification
6-02	BORAX-09	BORAX II through V Reactor Building	T1	X	A D&D removal and containment action was conducted in 1996 to remove RCRA hazardous materials and to leave the site in a safe and stable condition until a final assessment can be made during the OU 10-04 RI/FS. Clean and radioactive soil was used during the D&D activity.
6-03	BORAX-05	BORAX Fuel Oil Tank, Southwest of AEF-602	T1		The tank, its contents, and associated piping were removed. Analytical results from biased soil samples (collected at 3.7 m [12 ft]) confirm that the site presents acceptable levels of risk to human health. There is no pathway to ecological receptors.
6-03	BORAX-07	BORAX Inactive Fuel Oil Tank by AEF-601	T1		The tank and associated piping were removed. Analytical results from biased soil samples (collected at 3.66 m [10 ft]) confirm that the site presents acceptable levels of risk to human health. There is no pathway to ecological receptors.
6-03	EBR-07	EBR-I (AEF-704) Fuel Oil Tank at (AEF-603)	T1		The tank, associated piping, and contaminated soil have been removed. Analytical results from biased soil samples confirm that the risk at this site is acceptable.
6-03	EBR-08	EBR-I (WMO-703) Fuel Oil Tank	T1	X	The tank, its contents, and associated piping have been removed. There are two small potentially contaminated areas that were not removed. Analytical results show that total petroleum hydrocarbons (TPH) are present in the soil at least 1.5 to 5.5 m (5 to 18 ft) below grade.
6-03	EBR-09	EBR-I (WMO-704) Fuel Oil Tank at WMO-601	T1	X	The tank has been grouted in place. Analytical results from biased soil samples indicate that selenium and silver are present and need to be evaluated further.
6-03	EBR-10	EBR-I (WMO-705) Gasoline Tank	T1	X	The tank and associated piping have been removed. TPH contamination probably from EBR-08 remains.
6-03	EBR-11	EBR-I Fuel Oil Tank (EBR-706)	T1	X	The tank, associated piping, and contaminated soil have been removed. A small quantity of TPH contamination remains.
6-03	EBR-12	EBR-I Diesel Tank (EBR-707)	T1	X	The tank, associated piping, and contaminated soil have been removed. A small quantity of TPH contamination remains.
6-03	EBR-13	EBR-I Gasoline Tank (EBR-708)	T1		The tank, associated piping, and contaminated soil have been removed. Analytical results from biased soil samples confirm that no source is present at this site.

Table C1-1. (continued).

OU	Site	Site Description	Track[a]	In[b]	Justification
6-03	EBR-14	EBR-I Gasoline Tank (EBR-717)	T1		No evidence of contamination above tank management program (TMP) guidelines is apparent. It is believed that the tank has been removed based on site excavation and geophysics.
6-04	EBR-15	Radionuclide Soil Contamination (EBR-1)	T1	X	This site was previously assessed during OU 10-06 and a RA was completed. The RA is being evaluated under OU 10-04 as a final action.
WAG 10					
None	ARVFS-01	Army Reentry Vehicle Facility Site (ARVFS) Containers of Contaminated NaK	NA		Containers and the bunker have been removed. There are no records of spills. Independent sampling not detected contaminants of concern.
None	ARVFS-02	ARVFS Tank Containing Low-level Radioactive Waste (under white building)	NA		The tank was contaminated with radionuclides. The tank, associated piping, and contaminated soil have been removed. There is no source.
None	DF-1	Dairy Farm Disposal Pit	NA		This pit was used to dispose of excess concrete rebar, and later for solid waste from a dairy operated on the site. There is no evidence of hazardous materials being disposed. All residual material in the pit has been removed. There is no source.
None	EOCR-01	Experimental Organic-Cooled Reactor (EOCR) Leach Pond	NA		This pond was never used for the designed purpose. There is no evidence of hazardous waste disposal to the leach pond. There is no source.
None	EOCR-02	EOCR Injection Well	NA		The well was never used for the designed purpose. There is no evidence of hazardous waste disposal in the injection well. There is no source.
None	EOCR-03	EOCR Oxidation Pond	NA	X	This pond was never used for the designed purpose. However, concrete piping within the pond potentially contained asbestos and lead.
None	EOCR-04	EOCR Septic Tank	NA		The septic tank received sanitary waste from restrooms, showers, and sinks. There is no evidence of hazardous materials being disposed. The facility was never used for the designed purpose. There is no source.
None	EOCR-05	EOCR Blowdown Sump (EOCR-719)	NA		This sump was never used because the facility was never completed. There is no evidence of hazardous waste being disposed. There is no source.

Table C1-1. (continued).

OU	Site	Site Description	Track[a]	In[b]	Justification
None	ZPPR-01	Zero Power Physics Reactor (ZPPR) Disposal Pit (outside Argonne National Laboratory-West [ANL-W] fence)	NA		This pit was used to dispose of excess fill rock; dirt; and small amounts of concrete, asphalt, rebar, and wood. There is no evidence of hazardous materials being disposed. There is no source.
None	STF	Security Training Facility (STF) (formerly EOCR)	D&D	X	Buildings contain asbestos. There are no data for this site.
10-01	LCCDA-01	Liquid Corrosive Chemical Disposal Area (LCCDA) Old Disposal Pit (west end)	T2	X	The site was evaluated during FY97. Low level radionuclides are present. Organic compounds in the vadose zone are suspected to originate from RWMC. Further sampling is not scheduled.
10-01	LCCDA-02	LCCDA Limestone Treatment and Disposal Pit (east end)	T2	X	The site was evaluated during FY97. No radionuclides were detected. Organic compounds in the vadose zone are suspected to originate from RWMC. Further sampling is not scheduled.
10-02	OMRE-01	Organic-Moderated Reactor Experiment (OMRE) Leach Pond	RI	X	The site was evaluated during FY97. Contaminants included radionuclides and organic compounds. The base of the pond was removed and backfilled with clean soil. Further sampling is scheduled during FY99.
10-03	ORD-01	Arco High Altitude Bombing Range	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-02	Naval Ordnance Test Facility (NOTF)	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-03	CFA-633 Naval Firing Site and Downrange Area	IA/T2	X	The data generated during the OU 10-05 IA require reevaluation.
10-03 (WAG 4)	ORD-04	CFA Gravel Pit	IA/T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03 (WAG 4)	ORD-05	CFA Sanitary Landfill Area	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-06	Naval Ordnance Disposal Area (NODA)	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-07	Explosive Storage Bunkers North of ICPP	IA/T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-08	National Oceanic and Atmospheric Administration (NOAA) Grid	IA/T2	X	Data generated during the OU 10-05 IA require reevaluation. Data from the scheduled FY99 soil characterization will be evaluated.

Table C1-1. (continued).

OU	Site	Site Description	Track[a]	In[b]	Justification
10-03	ORD-09	Twin Buttes Bombing Range	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-10	Fire Station II Zone and Range Fire Burn Area	IA/T2	X	Data generated during the OU 10-05 IA require reevaluation. Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-11	Anaconda Power Line	IA/T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-12	Old Military Structures	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-13	Mass Detonation Area	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-14	Dairy Farm Revetments	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-15	Experimental Field Station	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-16	Unexploded Ordnance East of the TRA	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-17	Burn Ring South of Experimental Field Station	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-18	Igloo-Type Structures Northwest of Experimental Field Station	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-19	Rail Car Explosion Area	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-20	Unexploded Projectiles East of ARVFS	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-21	Juniper Mine	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-22	Projectiles Found Near Mile Marker 17, 18, and 19	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-23	Rifle Range	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.

Table C1-1. (continued).

OU	Site	Site Description	Track[a]	In[b]	Justification
10-03	ORD-24	Land Mine and Fuze Burn Area	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-25	Ordnance and Dry Explosives East of the Big Lost River and North of the NRF	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-26	Zone East of the Big Lost River	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-27	Dirt Mounds Near the Experimental Field Stations, NOAA, and NRF	T2	X	No analytical data were collected during the Track 2 because there was no evidence of explosive soil contamination.
10-03	ORD-28	Craters East of ICPP	T2	X	Data from the scheduled FY99 soil characterization will be evaluated.
10-03	ORD-29	Big Southern Butte	T2	X	Based on the historical literature search and a subsequent personal interview, no explosive contamination exists at this site.
10-04	None	WAG 10 Comprehensive Snake River Aquifer RI/FS	RI	X	Migrating contaminant plumes.
10-04	STF-01	STF-601 Sumps and Pits	D&D	X	There are no data since this is a new site.
10-04	STF-02	STF Gun Range	RI	X	There are no data since this is a new site.
10-05	None	Ordinance Interim Action	IA	X	The six OU 10-05 sites (ORD-03, ORD-04, ORD-07, ORD-08, ORD-10 & ORD-11) are included in OU 10-03 sites listed above.
10-06	None	Radionuclide-Contaminated Soils	RI/RA	X	The results of the Removal Action will be reevaluated in the OU 10-04 RI/FS.
10-07	None	Telecommunication Cable	T1	X	Although a maximum lead concentration of 10.6 ug/L, which is below human health risk concentrations, was detected in 1 of the 14 soil samples analyzed in 1990, this site was not evaluated for risk to ecological receptors.

CERCLA process tracks:
NA = No Action—initial investigation determined sites were uncontaminated and no source present.
T1 = Track 1; T2 = Track 2; IA = interim action; RI = remedial investigation/feasibility study (RI/FS); RD/RA = remedial design/remedial action;
D&D = decommission and dismantlement.

Sites marked with "X" were not screened out of the ERA process during the initial site review.

RA = removal action

NTCRA = non-time-critical removal action.

Table C1-2. WAGs 6 and 10 operable units and sites of ecological concern.

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
WAG 6					
None	EBR-01	EBR I Reactor Building	Radionuclides, asbestos	Building, subsurface	Although the reactor has been removed from the building, the building potentially contains hazardous materials.
None	EBR-03	EBR-I Seepage Pit (WMO-702)	Radionuclides	Subsurface	In 1995, D&D activities discovered radionuclide-contaminated product in the associated EBR-04 septic tank.
None	EBR-04	EBR-I Septic Tank (WMO-701)	Radionuclides	Subsurface	In 1995, D&D activities discovered radionuclide-contaminated product in the tank.
6-01	BORAX-02	Boiling Water Reactor Experiment (BORAX) I Burial Site	Radionuclides	Surface, subsurface	Although this site was analyzed and remediated under the WAG 5 OU 5-05/ 6-01 RI/FS, the remedy selected (i.e., capping) was not evaluated for risk to ecological receptors.
6-02	BORAX-01	BORAX II through V Leach Pond	Radionuclides, metals, volatile organic compounds (VOCs)	Subsurface	The residual radionuclide, metal, and VOC contamination, located 8 ft below grade, remained when the pond was backfilled in 1982.
6-02	BORAX-08	BORAX V Ditch	Cs-137	Subsurface	Although a removal action was completed in 1995, residual Cs-137 subsurface contamination exists.
6-02	BORAX-09	BORAX II through V Reactor Building	Radionuclides, metals, asbestos	Building, surface, subsurface	A 1996 D&D removal and containment action indicated that the subfloor (levels between the surface and 52.5 ft below grade) of the building were abandoned in place.
6-03	EBR-08	EBR-I (WMO-703) Fuel Oil Tank	Total petroleum hydrocarbons (TPH)	Subsurface	In 1990, the tank was removed, however due to access limitations, contamination remains in a small area south (below 5 ft) and east of the excavation.

Table C1-2. (continued).

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
6-03	EBR-09	EBR-I (WMO-704) Fuel Oil Tank at WMO-601	Metals	Subsurface	The site is not a human health concern. In 1992, the tank was abandoned in place since removal would have compromised the building's integrity.
6-03	EBR-10	EBR-I (WMO-705) Gasoline Tank	TPH	Subsurface	The site is not a human health concern. In 1990, the tank was removed but the samples collected at base of the excavation indicated that TPH contamination remains at 9.5 ft below grade.
6-03	EBR-11	EBR-I Fuel Oil Tank (EBR-706)	TPH	Subsurface	The site is not a human health concern. In 1990, the tank was removed and samples collected at the base of the excavation indicated that 350 mg/kg TPH remained between 8 and 10 ft below grade.
6-03	EBR-12	EBR-I Diesel Tank (EBR-707)	TPH	Subsurface	The tank was removed in 1989 but TPH contamination (30 mg/kg) remained between 1 and 10 ft below grade.
6-04	EBR-15	Radionuclide Soil Contamination (EBR-1)	Radionuclides	Surface, subsurface	Although a removal action was conducted in 1994, residual soil contamination around a fence post and piping from the surface to at least 3 ft below grade remains at the site.
WAG 10					
None	EOCR-03	Experimental Organic-Cooled Reactor (EOCR) Oxidation Pond	Asbestos and lead	Surface, subsurface	The site is potentially contaminated; it was never used for its designated purpose.
None	STF	Security Training Facility (STF) (formerly EOCR)	Asbestos	Surface, subsurface	The building (STF-601) was used intermittently since 1963 for material storage, security force maneuvers and occasional destructive testing of reactor components and hazardous materials.

Table C1-2. (continued).

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
10-01	LCCDA-01	Liquid Corrosive Chemical Disposal Area (LCCDA) Old Disposal Pit (west end)	Radionuclides, metals	Surface, subsurface	Investigations in FY97 indicated that organic vapors were in the vadose zone. Radionuclide contamination was present at this site. Additional sampling is not scheduled.
10-01	LCCDA-02	LCCDA Limestone Treatment and Disposal Pit (east end)	Radionuclides, metals	Surface, subsurface	Investigations in FY97 indicated that organic vapors were present in the vadose zone. Additional sampling is not scheduled.
10-02	OMRE-01	Organic-Moderated Reactor Experiment (OMRE) Leach Pond	Radionuclides, metals, organic compounds	Surface, subsurface	Additional sampling for organic compounds and radionuclides will be conducted during FY99 and the results will be incorporated into the OU 10-04 RI/FS.
10-03	ORD-01	Arco High Altitude Bombing Range	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-02	Naval Ordnance Test Facility (NOTF)	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-03	CFA-633 Naval Firing Site and Downrange Area	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	The data generated during the OU 10-05 IA need to be reevaluated.
10-03 (WAG 4)	ORD-04	CFA Gravel Pit	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03 (WAG 4)	ORD-05	CFA Sanitary Landfill Area	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-06	Naval Ordnance Disposal Area (NODA)	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-, TPH[1]	Surface, subsurface	Existing data need to be reevaluated and additional sampling will occur during FY99.
10-03	ORD-07	Explosive Storage Bunkers North of ICPP	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.

Table C1-2. (continued).

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
10-03	ORD-08	National Oceanic and Atmospheric Administration (NOAA) Grid	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents. Sampling is scheduled for FY99.
10-03	ORD-09	Twin Buttes Bombing Range	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No evidence of live or inert ordnance was found during the 1994 removal action or the Track 2 to suggest that contamination is present.
10-03	ORD-10	Fire Station II Zone and Range Fire Burn Area	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	The data collected during the IA will be reevaluated. Sampling is scheduled for FY99.
10-03	ORD-11	Anaconda Power Line	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-12	Old Military Structures	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-13	Mass Detonation Area	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	The data collected during FY97 indicate that no contamination is present in the areas surrounding the craters. No analytical data exist for the craters. Contamination is suspected in the craters. Sampling is scheduled during FY99.
10-03	ORD-14	Dairy Farm Revetments	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-15	Experimental Field Station	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	Contamination remains at this site. Sampling is scheduled during FY99.
10-03	ORD-16	Unexploded Ordnance East of the TRA	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents. Sampling is scheduled during FY99.

Table C1-2. (continued).

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
10-03	ORD-17	Burn Ring South of Experimental Field Station	Picric acid, SVOCs, VOCs, , NO_2^-, NO_3, TPH[2], pesticides[2], PCBs[2]	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents plus constituents associated with the burning of tires. Sampling is scheduled during FY99.
10-03	ORD-18	Igloo-Type Structures Northwest of Experimental Field Station	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-19	Rail Car Explosion Area	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents. Sampling is scheduled during FY99.
10-03	ORD-20	Unexploded Projectiles East of ARVFS	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-21	Juniper Mine	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Subsurface soil	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-22	Projectiles Found Near Mile Marker 17, 18, and 19	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-23	Rifle Range	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-24	Land Mine and Fuze Burn Area	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents. Sampling is scheduled during FY99.
10-03	ORD-25	Ordnance and Dry Explosives East of the Big Lost River and North of the NRF	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.
10-03	ORD-26	Zone East of the Big Lost River	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents.

Table C1-2. (continued).

OU	Site	Site Description	COPCs	Contaminated Medium	Comments
10-03	ORD-27	Dirt Mounds Near the Experimental Field Stations, NOAA, and NRF	None	Surface, subsurface	No evidence of live or inert ordnance was found during the Track 2 to suggest that contamination is present.
10-03	ORD-28	Craters East of ICPP	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	No analytical data exist, therefore the COPCs listed are general ordnance constituents. Sampling is scheduled during FY99.
10-03	ORD-29	Big Southern Butte	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface, subsurface	Based on the historical literature search and a subsequent personal interview, no explosive contamination exists at this site.
10-04	None	WAG 10 Comprehensive Snake River Aquifer RI/FS	Radionuclides, metals, VOCs	Ground water	Groundwater will not be quantitatively addressed for ecological receptors.
10-04	STF-01	STF-601 Sumps and Pits	Asbestos	Surface, subsurface	Results of the sampling completed by D&D in FY98 indicate that asbestos is present in the building.
10-04	STF-02	STF Gun Range Berm	Copper, lead, creosote	Surface, subsurface	The sampling scheduled for FY98 was postponed. A Track 1 will be conducted in FY99.
10-05	None	Ordinance Interim Action	Picric acid, SVOCs, VOCs, NO_2^-, NO_3^-	Surface	Since the IA sites (ORD-03, ORD-04, ORD-07, ORD-08, ORD-10 & ORD-11) are addressed individually in OU 10-03, this OU will not be addressed in the ERA.
10-06	None	Radionuclide-Contaminated Soils	Radionuclides	Surface	The OU 10-06 results will be evaluated for risk to ecological receptors during the OU 10-04 RI/FS.
10-07	None	Telecommunications Cable	Lead	Subsurface	The Track 1 data need to be evaluated for risk to ecological receptors.

[1] A small uncharacterized stain is present at this site.

[2] This is an uncharacterized burn site.

REFERENCE

Rood, S. M. G., A. Harris, G. J. White, 1995, *Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory*, INEL-94/0250, Lockheed Martin Idaho Technologies Company.

Appendix C2

OU 10-04
Ecological Risk Assessment Data Gap Analysis Report

CONTENTS

FIGURES

TABLES

ACRONYMS

ABS	absorption fraction
AR	administrative record
BAF	bioaccumulation factor
BBS	breeding bird survey
BW	body weight
COPC	contaminant of potential concern
CSM	Conceptual Site Model
DEQ	Department of Environmental Quality
DOE-HQ	DOE Headquarters
DOE/ID	Department of Energy Idaho Operations Office
EBSL	ecological based screening level
ED	exposure duration
EDGA	ecological data gap analysis
EPA	Environmental Protection Agency
ERA	ecological risk assessment
ESRF	Environmental Science and Research Foundation
FFA/CO	Federal Facility Agreement and Consent Order
FS	feasibility study
FSP	Field Sampling Plan
FY	fiscal year
GIS	Geographic Information System
GPS	global positioning system
HQ	hazard quotient
ICPP	Idaho Chemical Processing Plant

IDHW	Idaho Department of Health and Welfare
INEEL	Idaho National Engineering and Environmental Laboratory
INEL	Idaho National Engineering Laboratory (renamed INEEL in 1997)
IR	ingestion rate (food and prey)
IWP	industrial waste pond
LDRD	laboratory directed research and development
LOAEL	lowest observed adverse effect level
LOFT	Loss-of-Fluid Test Facility
MDL	method detection limit
NOAEL	no observed adverse effect level
NRDA	Natural Resource Damage Assessment
OU	operable unit
PP	percent prey
PS	percent soil
PUF	plant uptake factor
PV	percent vegetation
RESL	Radiological Environmental Sciences Laboratory
RI/BRA	remedial investigation/baseline risk assessment
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SLERA	screening level ecological risk assessment
SOW	Statement of Work/Scope of Work
SUF	site use factor
TAN	Test Area North
T/E	threatened or endangered

TRV	toxicity reference value
TSF	Technical Support Facility
VOCs	volatile organic compounds
WAG	waste area group
WI	water ingestion rate
WRRTF	Water Reactor Research Test Facility

Appendix C2
OU 10-04
Ecological Risk Assessment Data Gap Analysis Report

C2-1. INTRODUCTION

This report is a continuation of the *Approach and Data Gap Identification for OU 10-04 INEL-Wide Ecological Risk Assessment Technical Memorandum* (Idaho National Engineering Laboratory [INEL] 1996a), which is available in the public administrative record (AR), hereafter referred to as the Eco Tech Memo (INEL 1996). The Eco Tech Memo (INEL 1996) lists data gaps and gives a recommended approach to fill the data gap. The purpose of this Operable Unit (OU) 10-04 ecological data gaps report is to:

- Document the status of the data gaps identified in the Eco Tech Memo (INEL 1996)
- Identify remaining and new data gaps that need to be addressed prior to the initiation of the OU 10-04 ecological risk assessment (ERA)
- Document the status of the waste area group (WAG)-specific ERA activities
- Review agency or stakeholders comments and concerns that must be addressed prior to initiation of the OU 10-04 ERA.

For the purposes of this report, three general categories of OU 10-04 data gaps have been defined: sampling data gaps, evaluation or analysis data gaps, and WAG-specific data gaps.

Sampling data gaps generally represent Idaho National Engineering and Environmental Laboratory (INEEL)-specific measurements required for site characterization, ERA modeling, or supporting quantitative and qualitative analyses. For example, contaminant tissue concentrations for biotic receptors are required for exposure modeling, but have not been comprehensively sampled for INEEL receptors. Sampling data gaps may not always be filled with sampling activities, but may also be resolved through other methods.

Evaluation or analysis data gaps involve the need for compilation and/or review of existing data and information prior to conducting the OU 10-04 ERA. For example, 1997 sampling data must be compiled and evaluated so results can be used to verify and refine WAG ERA exposure models to support OU 10-04. Many data gaps must be filled through literature review and require generation and verification of electronic data sets (e.g., Geographic Information System [GIS] mapping).

The WAG-specific data gaps include deficiencies in WAG-level information that will impact completion of the OU 10-04 ERA. An example of this type of data gap is the requirement for individual WAG ERA results prior to conducting the OU 10-04 assessment. These data gaps will generally be resolved at the WAG level.

Data gaps are presented in the general order they were identified in the Eco Tech Memo (INEL 1996). The INEEL-specific tasks to support steps of the EPA ERA process guidance are detailed in Figure C2-1-1. Individual data gaps have been further grouped to address (a) collection of new

biological survey and biotic sampling data (Subsection C2-2), (b) compilation of WAG ERA results (Subsection C2-3), (c) compilation of existing data which includes characterization of contaminant extent and concentration (Subsection C2-4), (d) development of ERA methodology (Subsection C2-5), and (e) review of stakeholders and agency comments (Subsection C2-6). A summary of OU 10-04 ERA data gaps is presented on Table C2-1-1. Table C2-1-1 specifies the type of data gap (i.e., sampling [S], evaluation [E] or WAG-specific [W]), provides a recommended method for filling each, and discusses the risks associated with not filling the data gap.

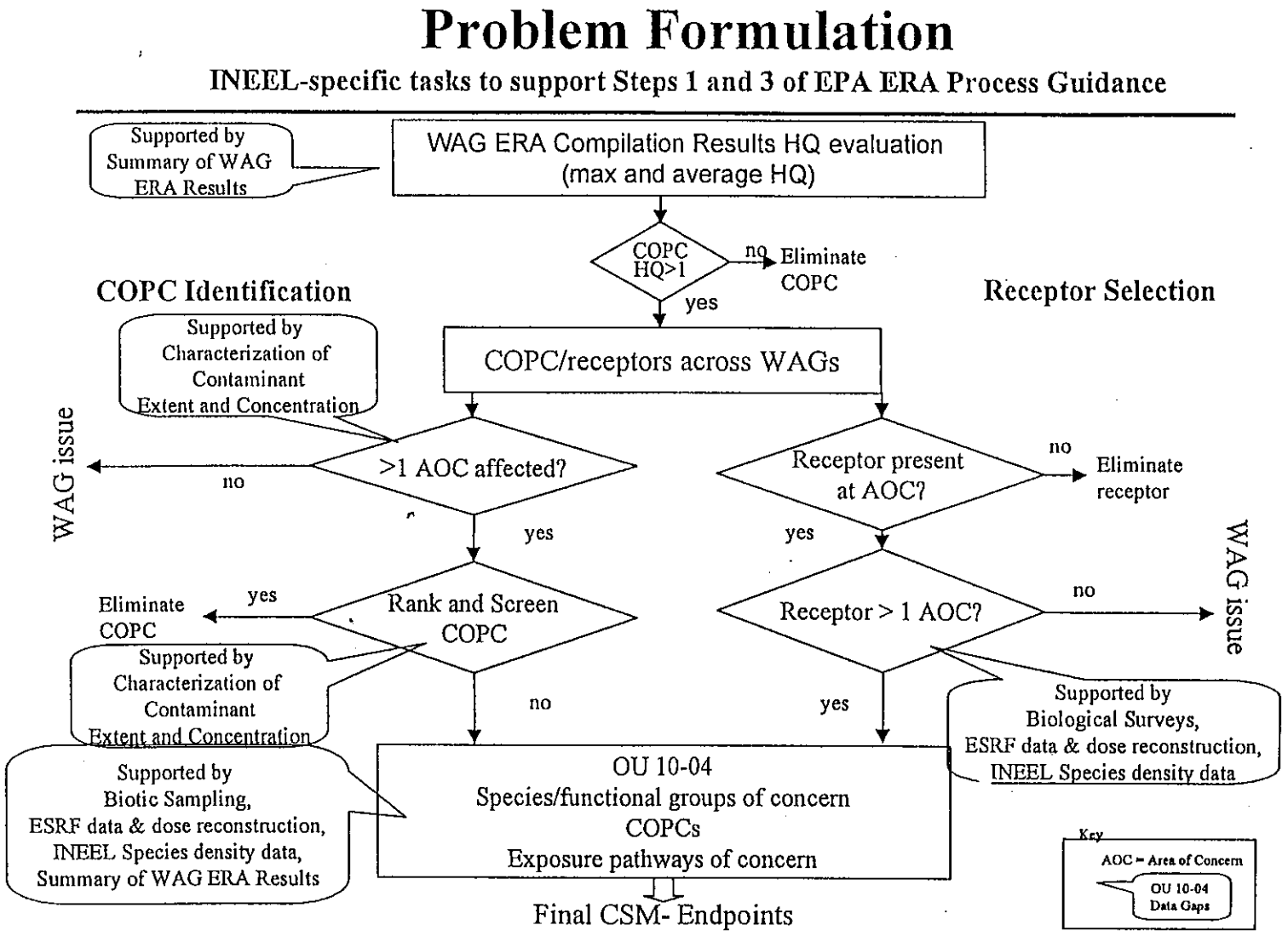

Figure C2-1-1. INEEL-specific tasks to support steps of EPA ERA process guidance.

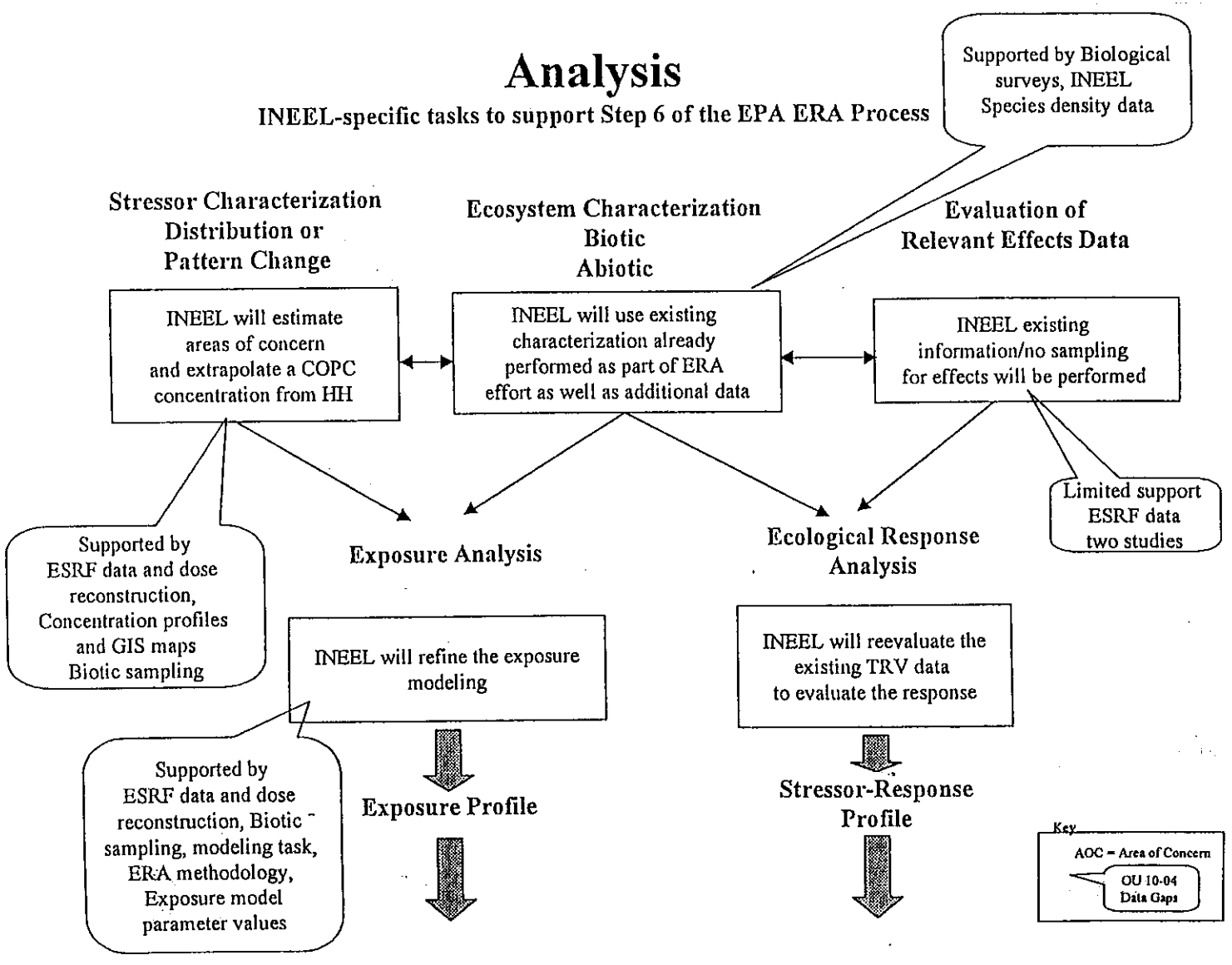

Figure C2-1-1. (continued).

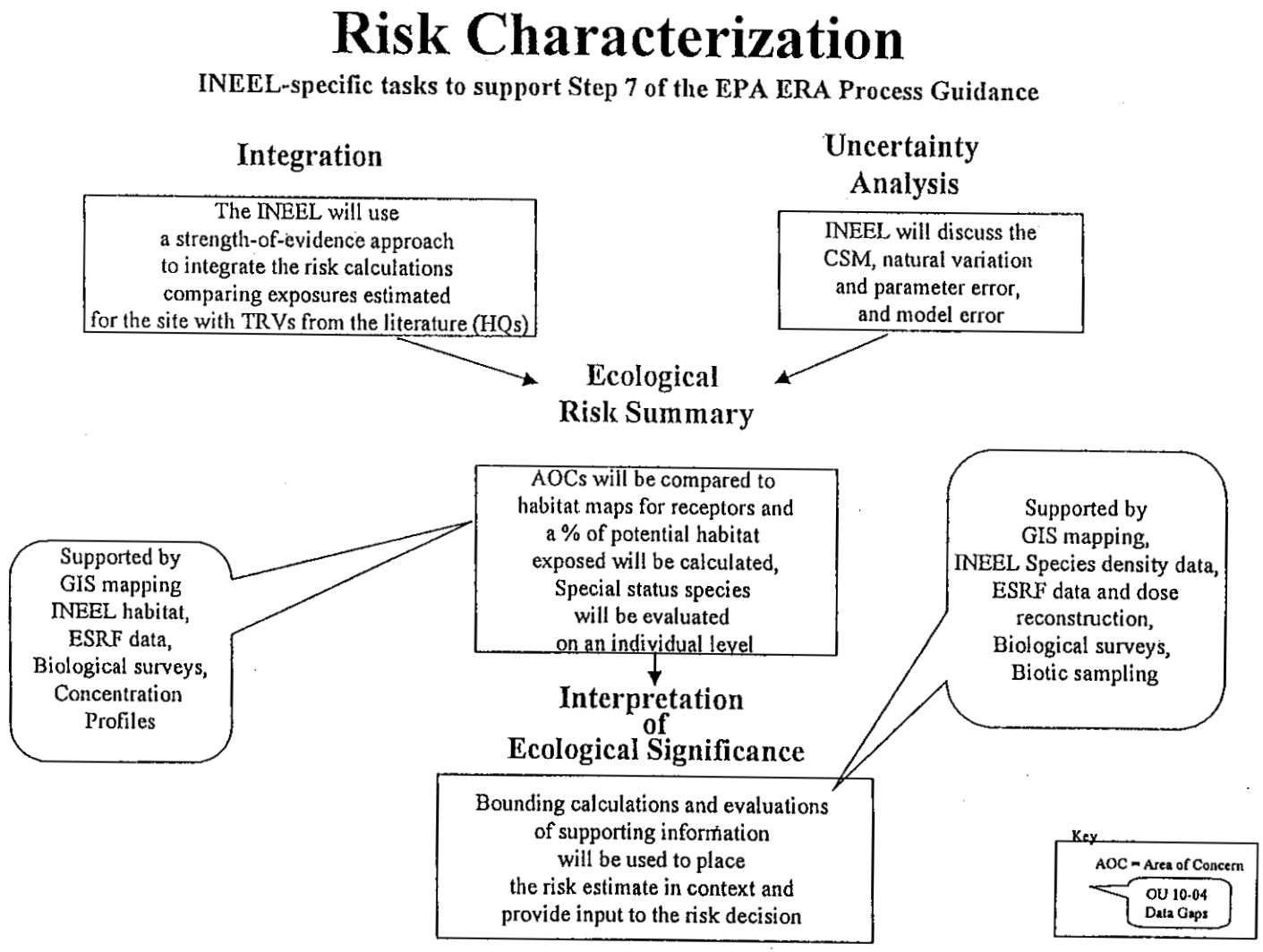

Figure C2-1-1. (continued).

Table C2-1-1. Summary of remaining data gaps for the OU 10-04 ERA.

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
New Data (Subsection C2.2)				
Biological Surveys	Biological surveys of sites of concern for WAGs 6, 7, 8, and 10.	S	A survey will be scheduled with an assigned WAG project manager and conducted in Fiscal Year (FY)-98. Surveys will incorporate protocols used in other WAG surveys and the results will be compiled and documented for use in the OU 10-04 ERA	Due to lack of data, conservative assumptions concerning presence/absence of threatened or endangered (T/E) and species of concern may be made in assessment.
	Area surveys for WAG 10 (T/E and species of concern).	S	Area surveys will be completed by the Environmental Science and Research Foundation (ESRF) in FY-98 using protocols previously documented by the ESRF.	Assessment areas will be assumed to support T/E and species of concern.
Biotic Sampling	Laboratory analysis of rabbit and deer mice samples collected during the 1997 field season.	S	INEEL laboratory to perform the analysis on these species in FY-98.	These species represent secondary trophic components of the foodweb. Lack of tissue concentrations for these species will limit verification of foodweb models.
	Data validation and statistical evaluation of the 1997 data.	E	Data will be validated as laboratory analyses are completed. A preliminary statistical evaluation of data received to date is available in Appendix D1.	Lack of validation may increase uncertainty which may limit verification and refinement of ERA exposure models.
Ecological Characterization	Ecological characterization of sites identified in Table 1-1.	S	It is assumed that human health risk characterization will be adequate for ecological receptors. However, sampling detection limits will be set to be protective of ecological receptors.	

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
Summary of WAG ERA Results (Subsection C2.3)				
	WAG ERAs for WAGs 4, 5, 6, 7, and 10.	W	WAG 4 and 5 ERAs will be conducted as part of the WAG-specific comprehensive remedial investigation/baseline risk assessments (RI/BRAs). WAG 7 will perform an ERA in FY-98. The ERAs for WAGs 6 and 10 sites will be performed to support the OU 10-04 ERA problem formulation and will be presented in the OU 10-04 ERA.	No hazard quotient (HQ) can be generated for contaminant of potential concern (COPCs) associated with individual WAGs. The timing of the WAG 7 ERA will increase the uncertainty in the OU 10-04 ERA. The lack of a final ERA for WAG 7 will require assumptions at the OU 10-04 level concerning WAG 7 contaminants and their concentration in the evaluation of cumulative risk to ecological receptors.
	ERA summary for WAGs 1, 4, 5, 6, 7, 9, and 10.	E,W	WAGs 1, 4, 5, 6, 9, and 10 ERA results will be summarized as discussed in Appendix D1. The WAG 7 ERA will not be performed at this time and only the initial screening will be discussed.	WAG summaries are needed to finalize the COPC list for OU 10-04 ERA and receptors of concern. Not incorporating these results in the OU 10-04 ERA will result in unnecessary inclusion of COPCs and receptors.
	ERA Summary for WAG 8.		WAG 8 assessments were conducted using a different methodology. The results for WAG 8 will be included in the OU 10-04 assessment as appropriate.	
Compilation and Review of Existing Data (Subsection C2.4)				
INEEL Species Distribution and Habitat	GIS maps and analyses for additional species of concern (to be determined by finalized assessment endpoint and receptors Subsection C2-5.3).	E	Conduct steps 2 and 3 of process described in Subsection C2-4.1 for other species to be evaluated in the ERA. GIS maps of receptor distribution in the assessment area will be used in conjunction with the GIS maps of the contamination extent and concentrations to calculate exposure for analysis.	Without this information, conservative receptor exposures will be assumed and will increase the uncertainty in the ERA results.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
	Regional population data for species to be evaluated in the ERA.	E	Compile relative density values from literature and GIS analyses (no plan to fill–see Subsection C2-5.2).	Interpretation of potential impacts to regional resources as a result of INEEL activities will require regional receptor data for comparison to the INEEL. Interpretation at the regional level is beyond the scope of the OU 10-04 ERA (see Subsection C2- 5.2).
	Verification of breeding bird survey (BBS) data collection point coordinates.	S	Incorporate global positioning system (GPS) locations with GIS BBS files. The ES&RF is scheduled to complete collection of GPS locations during the 1998 field season. These data will be made available for incorporation into the revised OU 10-04 *Work Plan* or the OU 10-04 RI/FS.	The BBS is the primary source for avian distribution on the INEEL. The only two T/E species and the majority of other species of concern on the INEEL are birds. The INEEL-wide distribution for those species will be based on association with specific vegetation cover class(es). Because no accurate measurements for BBS survey locations exist, the vegetation class associated with bird sightings has been approximated. Distribution for these species may, therefore, be over or under estimated.
Characterization of Contaminant Extent and Concentration	COPC list for OU 10-04.	E	Summaries from WAG ERAs will be used to develop a COPC list for OU 10-04. This list will be refined (i.e., reduced) as discussed in Appendix D4.	Not limiting the number of contaminants to be assessed during the OU 10-04 ERA will result in evaluation of all the COPCs for which target HQs were exceeded in the WAG ERAs.
	Concentration profiles and spatial extent for contaminants which have been characterized by sampling outside the WAG boundaries and for WAGs 6 and 10 sites.	S,E	The OU 10-06 and ESRF data will be used to develop an assessment area outside of the WAG areas. Existing data collected for human health activities will be used to characterize the spatial extent and concentrations of contaminants at WAGs 6 and 10 sites.	Without these data, conservative extent and contaminant concentrations across the assessment areas must be assumed.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
	Concentration profiles and spatial extent for OU 10-04 COPCs which have not been characterized by sampling outside the WAG boundaries.	S,E	Contaminant concentrations and spatial extent will be extrapolated from similar sampled contaminants (i.e., radionuclides to metals and organics).	Concentration profiles and spatial extent for unsampled OU 10-04 COPCs may not be accurately characterized in the assessment. Extrapolation based on limited sampling will introduce significant uncertainty into the risk assessment. This uncertainty will be discussed in the OU 10-04 ERA.
	GIS maps of the concentration profiles and spatial extent for COPCs to be evaluated in the OU 10-04 ERA.	E	GIS maps of receptor distribution in the assessment area will be used in conjunction with the GIS maps of the contamination extent and concentrations to calculate exposure for the analysis.	Without these data, maximum extent and higher, homogeneous contaminant concentrations across the assessment areas must be assumed.
	Characterization of contaminant extent in soil, sediment and water in the Big Lost River drainage.	S,E	Based on historic and process knowledge and information, these sites are not expected to be contaminated. Sampling of the Big Lost River drainage will be performed by the ESRF in coordination with ER requirements. This will be discussed qualitatively in the ERA. INEEL surface water resources other than facility ponds will not be evaluated as part of the OU 10-04 ERA.	Lack of sampling may result in failure to identify potential contamination in an important habitat at the INEEL. It will be necessary to discuss the uncertainty associated with this data gap in the OU 10-04 ERA. This will include addressing possible concerns about substantiating the historic process knowledge, carrying waste downstream, the plume contamination from CPP that cuts across the BLR in that area and the existence of data that show radionuclides in the fish of the BLR.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
ESRF Data and Dose Reconstruction	ESRF study evaluation and dose reconstruction for use in the OU 10-04 ERA.	E	The ESRF studies identified in Appendix C of the Guidance Manual will be further evaluated for use in the OU 10-04 ERA. A dose from radionuclides to receptors will be calculated and presented. The information will be used in conjunction with the 1997 biotic sampling data to verify foodweb models used in the WAG ERAs and to refine these models for the exposure modeling used in OU 10-04. The ESRF has collected information on the concentrations of radionuclides in biota at the INEEL and evaluated the sources of this contamination. This information will provide input to back-calculate biotic tissue concentrations for INEEL receptors and to verify the WAG ERA foodweb models. The information will also be used to refine the OU 10-06 assessment area extent and concentration.	Omission of these data from the OU 10-04 assessment will require substitution of non-INEEL literature values and assumptions that may affect extent and concentration levels used to define the assessment area.
	GIS maps of ESRF data summaries.	E	Available data will be converted to the GIS format and entered into the GIS system to support development of assessment areas.	See above.
EBSL and Exposure Model Parameter Values	Toxicity reference values	E	Toxicity reference values (TRVs) will remain a data gap throughout the risk assessment process. TRVs will need to be developed for previously unidentified contaminants as discussed in Appendix D4. Additional information on the toxicity of a contaminant to ecological receptors needs to be incorporated into existing TRVs as it becomes available.	TRVs should be as current as possible. Not updating existing TRVs results in greater assessment uncertainty.
	Plant uptake factor (PUFs) and/or bioaccumulation factors (BAFs) for previously unidentified COPCs.	E	Literature search and/or use of allometric equations as discussed in Appendix D3.	PUF and BAF default values will be used which may result in greater uncertainty.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
	Evaluation of 1997 biotic sampling data.	E	1997 biotic sampling data will be statistically evaluated and compared to literature values used in the WAG ERAs. This will be documented in the OU 10-04 ERA.	Summarizing available site-specific information is important for reducing the uncertainty in the OU 10-04 ERA.
	Evaluation of laboratory directed research and development (LDRD) plant uptake results (Hampton et al. 1998).	E	1997 LDRD results will be evaluated and compared to literature based PUF values used in the WAG ERAs. This will be documented in the OU 10-04 ERA.	Summarizing available site-specific information available is important for reducing the uncertainty in the OU 10-04 ERA.
	Refined receptor diet composition.	S,E	The need for specific dietary components developed from available literature is contingent on the final exposure model selection (Subsection C2- 4.4.3).	More general (and conservative) dietary models will be used for receptor exposure calculations.
ERA Methodology (Subsection C2.5)				
Pathway and exposure modeling	Contaminant/receptor specific input values to calculate exposure from dermal pathway.	E	When OU 10-04 ERA COPCs and receptors of concern are identified and determined to have a significant dermal pathway, input values will be developed.	Conservative assumptions will be made in the assessment.
	Contaminant/receptor specific input values to calculate exposure from inhalation pathway.	E	When OU 10-04 ERA COPCs and receptors of concern are identified and determined to have a significant inhalation pathway, input values will be developed.	Conservative assumptions will be made in the assessment.
	Pathway and exposure modeling verification and refinement.	E	Evaluation of ERSF data and the 1997 sampling data to develop biotic tissue concentrations (exposure) for sampled receptors and contaminants. This information will be used to verify and refine the foodweb and exposure models used in the OU 10-04 ERA process.	Exposure models may not accurately represent INEEL foodweb and receptor exposure.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
	Evaluate TRV development methodologies to assess the value of using a less conservative or different approach.	E	Discussion of various TRV development methodologies and presentation of results using different approaches.	Based on recent discussions among risk assessors, TRVs currently used in the INEEL ERAs may be overly conservative.
Spatial and Temporal Scale for OU 10-04	Finalized OU 10-04 contaminant extent and concentrations.	S,E	See Subsection C2-4.2.	
	Regional population data for OU 10-04 receptors.	S,E	Literature (no plan to fill).	No interpretation of the OU 10-04 results in a regional context can be made and may impact risk management decisions.
	Contaminant characterization for INEEL natural surface water systems.	S,E	The OU 10-04 ERA will assume that no contamination to INEEL natural surface water resources has occurred. Verification of this assumption will use existing studies, literature in a qualitative discussion, and sampling if identified as necessary. The ESRF will also do limited verification sampling in the Big Lost River Sinks area. INEEL surface water resources, other than facility ponds (if indicated by WAG ERA result), will not be evaluated as part of the OU 10-04 ERA.	May result in not identifying potential contamination in an important habitat at the INEEL.
OU 10-04 Assessment Endpoints	**Exposure Assessment**			
	Finalized contaminant extent (assessment area) and concentration maps.	E	Complete evaluation of existing soil and sediment data (see Subsection C2-4.2).	May result in selection of inappropriate assessment endpoints.
	Description of ecological setting.	S,E	Finalize assessment area (see Subsection C2-4.3).	Same as above.
	Determination of presence of rare and endangered species.	S,E	Complete biological surveys for WAGs 6,7,8, and 10 (see Subsection C2-2.1).	Same as above.

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
	Determination of exposure pathways.	E	Finalize COPC list (see Section C2-3).	Same as above.
	Hazard Identification			
	Evaluation of new and existing data.	E	See Section C2-4.	Same as above.
	Final COPC list for OU 10-04.	E	Complete WAG ERAs and summarize results (see Section C2-3).	Same as above.
	Receptor identification.	E	Finalize COPC list (for example of this process see Section D1-2-2).	Same as above.
Soil Fate and Transport	INEEL-specific fate and transport information for COPCs.	E	Literature.	Incomplete characterization of exposure pathways.
	Finalized COPC list.	E	WAG ERAs summaries (see Section C2-3).	All COPCs will not be assessed. Fish and Wildlife service comments will not be addressed.
Aquatic Foodweb	No data gaps remain.			

Table C2-1-1. (continued).

Data Gap Group and Category	Data Gap	Type[a]	Method to Fill	Risk of not Filling
Stakeholder and Agency Comments (Subsection C2-6)				
	Resolve or consider identified agency comments prior to the development of the OU 10-04 ERA. (This includes comments directed at ecological concerns generated by responses to OU 10-04 and WAG-specific documentation.)	E	Several specific actions have been identified for stakeholders and agency comments that are presented in Tables C2-6-1 and C2-6-2 of this report.	Unresolved stakeholders or agency comments could delay the OU 10-04 Record of Decision (ROD).

a. S—sampling data gap.
E—evaluation data gap.
W—WAG data gap.

C2-2. NEW DATA

C2-2.1 Biological Surveys

Several biological surveys were identified in the Eco Tech Memo (INEL 1996) as data gaps. Currently only a few outstanding issues exist that require attention prior to conducting the OU 10-04 remedial investigation/feasibility study (RI/FS).

Biological surveys at the WAGs provide the confidence that sensitive species have been protected, while eliminating over conservatism in the assessment. Conservative assumptions concerning accessibility and potential exposure to contaminants at each site may also be eliminated by a WAG ecological characterization survey.

In 1996, field surveys were conducted in the *areas surrounding* WAG facilities (not inside WAG boundaries) to assess the presence and use of those areas by threatened or endangered (T/E) or species of concern (i.e., species formerly designated as C2). Those species are listed in Table 2-1 in Section 2 of the Work Plan for WAGs 6 and 10 OU 10-04 Comprehensive RI/FS, hereafter referred to as the *Work Plan*. The surveys were conducted by the Environmental Science and Research Foundation (ESRF). Findings for WAGs 1, 2, 3, 4, 5, 6, 7, and 9 have been documented in a report that includes (a) survey protocols, (b) results for individual WAGs, and (c) an interpretive summary for the OU 10-04 ERA conducted as part of the OU 10-04 investigation (Morris, 1998). Specific information collected and reported for each T/E or species of concern includes:

- Survey date and conditions
- Area encompassed by the surveys (global positioning system [GPS] mapping where practical)
- GPS locations for observed habitat, sign, and species sighted (where practicable)
- Habitat description, the proximity to WAG or site, and an estimate of whether contaminated sites or areas are within the home range of members of the species in question
- Species presence, abundance, current site use, past site use (historical sightings or surveys), and anticipated site use (professional judgement)
- An estimated site or area population (where possible)
- Surveys for some species were also supported by geographic information system (GIS) analyses using recently developed habitat models and existing long term data sets (i.e., breeding bird survey [BBS] data).

On July 31 and August 20, 1997, field surveys were conducted for *individual sites of concern* within WAG facilities that have been or are currently being evaluated as part of the WAG ERAs. The results of these surveys are summarized in Appendix D1. An on-site inspection was conducted and each contaminated site was evaluated for habitat qualities and potential to support INEEL T/E or species of concern. The following site habitat attributes were evaluated with regard to suitability for each species:

- Size
- Substrate (gravel, asphalt, lawn, etc.)
- Natural or manmade features that may entice wildlife (water, lights, etc.)
- Proximity to areas or sites of facility activity
- Presence and availability of food or prey
- Availability of nesting, roosting, or loafing habitat
- Signs of wildlife use
- Prior history and known sightings or use.

Attributes were subjectively rated for positive contribution to overall habitat suitability. A rating of high, medium, low, or none was assigned based on the number of positive habitat features and probability that the species of concern uses or may use the site. The criteria, on which high, medium, low, or none ratings were assigned for individual habitat attributes, are discussed in Appendix D1. Although T/E and species of concern were of primary consideration, potential use by game species and unusual populations (i.e., spadefoot toad, Merriam's shrew) was also assessed. Sites rated overall as "low" have one or two positive attributes and consequently the potential for incidental use by wildlife. These sites may generally be discounted as contributing significantly to the chronic exposure of wildlife to contaminants of potential concern (COPCs). The duration and stringency of these surveys was not adequate to verify presence or frequency of occurrence of individual species. These surveys were conducted to provide information to allow evaluation of WAG sites of concern in an ecological context. It should be noted that habitat rating criteria are subjective, based on professional opinion supported by limited observation. A status of the biological surveys is shown in Table C2-2-1. Additional details of the surveys are included in Appendix D1.

Surveys of sites of concern and surrounding areas have been completed for WAGs 1, 2, 3, 4, 5, and 9. Surveys for WAGs 6, 7, 8, and 10 will be conducted in FY-99 after finalization of this *Work Plan*. A summary of the remaining biological survey data gaps is presented in Table C2-2-2.

C2-2.2 Biotic Sampling

Few data to characterize the uptake and bioaccumulation of contaminants in biological tissue have been collected for the INEEL. The lack of comprehensive INEEL specific data necessarily increases the uncertainty in INEEL-screening and WAG-level ERA exposure modeling. To support the OU 10-04 ERA, biological samples were collected during the summer of 1997 and analyzed for a suite of radiological and metal contaminants (organics were not sampled since metals were the drivers of risk to ecological receptors). These data will be evaluated and if appropriate used to refine biotic uptake and bioaccumulation factors used in WAG ERA dose models.

Table C2-2-1. Status of biological surveys.

WAG	Survey Status	
	Area[a]	Site[b]
1	C	C
2	C	C
3	C	C
4	C	C
5	C	C
6	C	I
7	C	I
8	C	I
9	C	C
10	I	I

C = complete.

I = incomplete.

[a] Results documented in Morris (1998).

[b] Results documented in Appendix D1.

Table C2-2-2. Biological and area survey data gaps.

Data Gap	Method to Fill
Biological surveys of sites of concern for WAGs 6, 7, 8, and 10.	A survey will be scheduled with an assigned WAG project manager and conducted in FY-99. Surveys will incorporate protocols used in other WAG surveys and the results will be compiled and documented for use in the OU 10-04 ERA.
Area surveys for WAG 10 (T/E and species of concern).	Area surveys will be completed by the ESRF in FY-99 using previously documented protocols (Morris 1998).

The media sampled during 1997 included:

- Soil
- Two plant tissue types (grass, sagebrush)
- Two mammal tissue types (deer mouse, cottontail)
- Insects (beetles, grasshoppers)
- Surface water and sediment.

Details of the sampling rationale, methodology, and COPCs for which analyses are being conducted are presented in the *Field Sampling Plan* (FSP) (Department of Energy Idaho Operations Office [DOE-ID] 1997a). A summary of 1997 sampling activities and available analytical results are presented in Appendix D1.

The OU 10-04 1997 study area locations were selected based on the availability of biotic media representing primary pathways for contaminant transfer through the INEEL foodweb as discussed in the FSP (DOE-ID 1997a). Sampling at these locations was performed to address data gaps (shown in Table C2-2-2) identified by the ecological risk assessment process at the INEEL. The objectives of the FY-97 sampling were to (a) obtain biological uptake data for radiological contaminants, and (b) obtain biological uptake data for metallic contaminants.

Additional rationale for media selection and details of the sampling methodologies are documented in the FSP (DOE/ID 1997a).

The following limitations and assumptions have been identified:

- 1997 biotic sampling data combined with an evaluation of the ESRF studies (see Subsection C2-4.3) will be adequate to characterize tissue concentrations (evaluate exposure) and verify foodweb models.

- Contaminant tissue concentrations in receptors of concern can be extrapolated from tissue concentrations in species previously sampled by ESRF or during the 1997 biotic field sampling.

- Tissue concentrations (to evaluate exposure) in avian and/or carnivore species will not be sampled. A combination of foodweb modeling and ESRF study evaluation will be used to calculate this exposure.

- Tissue concentrations (to evaluate dose) in aquatic species will not be sampled. This will be estimated using foodweb modeling.

- The 1997 data allow limited statistical interpretation across the INEEL.

- COPCs sampled in 1997 may not fully characterize final OU 10-04 COPC list.

- All foodweb linkages were not sampled (i.e., avian species, carnivores).

- Additional biotic tissue or soil concentration data will be collected to support the OU 10-04 ERA only if determined to be necessary during the OU 10-04 ERA Problem Formulation.

Based on the above assumptions, the remaining biotic sampling data gaps have been summarized in Table C2-2-3.

Table C2-2-3. Summary of remaining biotic sampling data gaps.

Data Gap	Method to Fill
Laboratory analysis of rabbit and deer mice collected during the 1997 field season.	Currently negotiating method detection limits (MDLs), etc., with the laboratory to perform the analysis on these species.
Finalize data validations and statistical evaluations of the 1997 data.	Data for rabbits and deer mice will be validated as available. A preliminary statistical evaluation is available in Appendix D1.

C2-3. SUMMARY OF WAG ERA RESULTS

A primary requirement for the OU 10-04 ERA is the compilation and evaluation of results from individual WAG ERAs. The WAG level ERAs are the second phase in a three phase approach, the third being the OU 10-04 ERA. A detailed discussion of the INEEL phased approach is given in Appendix D1.

A critical part of the OU 10-04 ERA problem formulation is to perform a WAG-level ERA for each INEEL facility and to interpret and combine the results of those assessments to identify the following:

- COPCs to be assessed for OU 10-04
- INEEL ecological receptors exposed to those COPCs
- Source, extent, and distribution of individual COPCs across the INEEL
- Additional WAG-level gaps in information or data that must be filled prior to conducting the OU 10-04 ERA.

A process for compiling the results of each WAG ERA has been developed for the purpose of identifying COPCs and receptors to be evaluated in the OU 10-04 ERA. The process includes the following steps:

1. Summarizing hazard quotients (HQs) > target value (1 for nonradionuclide and 0.1 for radionuclide) for each COPC, across sites and across COPCs (average, maximum, etc.)
2. Summarizing receptors for which HQ > target value (1 for nonradionuclide and 0.1 for radionuclide) by contaminant
3. Identifying receptors for which no toxicity reference values (TRVs) are available
4. Identifying number and location of sites acting as sources for each COPC.

The average HQs will be calculated by summing the HQs by contaminant for all sites within the WAG that are demonstrating concentrations above the ecological based screening levels (EBSLs) and background levels, and dividing by the number of sites. The maximum HQ will represent the highest calculated for that contaminant (Appendix D1).

Results from individual WAG ERAs will then be subjected to a ranking and screening procedure to combine COPCs and receptors of concern across all WAGs and prioritize COPC/receptor combinations for the OU 10-04 assessment. A preliminary summary of COPCs anticipated for screening and ranking for the OU 10-04 ERA is presented in Appendix D1, Attachment 1. An example summary of WAG ERA results is included in Table C2-3-1. The process for compiling all WAG ERA results and distilling the information to identify and prioritize COPCs and receptors to be assessed at the OU 10-04 level is presented in an Appendix D1 example from WAGs 2 and 3.

Table C2-3-2 gives the status of WAG ERAs and summarizes the remaining data gaps for each WAG. A summary of WAG-specific ERA data gaps is included in Table C2-3-3. ERA status and an

example of the individual WAG summaries are presented in Attachment C2-1. Screening level ecological risk assessments (SLERAs) have been performed for WAGs 1, 2, 3, 7, 8, and 9. WAG ERAs have been completed for WAGs 1, 2, 3, 8, and 9. ERAs are incomplete for WAGs 4, 5, 6, 7, and 10.

WAG ERA HQ results have been compiled for WAGs 2 and 3. These WAGs were chosen to serve as conservative examples upon which the demonstration of proposed ERA methodology would be based. Compilation and evaluation of results for WAGs 1, 4, 5, 7, 8, and 9 will be completed upon implementation of this *Work Plan.* The assessment for WAG 8 was completed using a somewhat different methodology. Evaluation and summary of this assessment may require additional steps.

Table C2-3-1. Draft example summary of WAG ERA results for arsenic.

Functional groups	Maximum Hazard Quotient (unitless)		Average Hazard Quotient (unitless)	
	WAG 2	WAG 3	WAG 2	WAG 3
Amphibian insectivores (A232)				
Avian herbivores (AV121)	<1	<1	<1	<1
Avian herbivores (AV122)	<1	<1	<1	<1
Avian herbivores (AV132)	<1	<1	<1	<1
Avian herbivores (AV142)	<1	<1	<1	<1
Avian herbivores (AV143)	<1	<1	<1	<1
Trumpeter swan	<1	<1	<1	<1
Avian insectivores (AV210)	2.10	1.79	<1	<1
Black tern	<1	<1	<1	<1
Avian insectivores (AV210A)	6.76	1.65	1.13	<1
Avian insectivores (AV221)	12.37	3.57	3.51	1.41
Avian insectivores (AV222)	17.89	2.86	3.79	1.17
Avian insectivores (AV222A)	11.64	1.75	2.42	<1
Avian insectivores (AV232)	<1	<1	<1	<1
Avian insectivores (AV233)	<1	<1	<1	<1
White-faced ibis	<1	<1	<1	<1
Avian insectivores (AV241)	<1	<1	<1	<1
Avian insectivores (AV242)	<1	<1	<1	<1
Avian carnivores (AV310)	<1	<1	<1	<1
Northern goshawk	<1	<1	<1	<1
Peregrine falcon	<1	<1	<1	<1
Avian carnivores (AV322)	<1	<1	<1	<1
Bald eagle	<1	<1	<1	<1
Ferruginous hawk	<1	<1	<1	<1
Loggerhead shrike	<1	<1	<1	<1
Avian carnivores (AV322A)	<1	<1	<1	<1
Burrowing Owl	<1	<1	<1	<1
Avian carnivores (AV333)	<1	<1	<1	<1
Avian carnivores (AV342)	<1	<1	<1	<1
Avian omnivores (AV422)	1.32	1.48	<1	<1
Avian omnivores (AV432)	<1	<1	<1	<1
Avian omnivores (AV433)	<1	<1	<1	<1
Avian omnivores (AV442)	<1	<1	<1	<1
Mammalian herbivores (M121)	<1	<1	<1	<1
Mammalian herbivores (M122)	4.40	<1	1.05	<1
Mammalian herbivores (M122A)	4.52	<1	1.02	<1
Pygmy rabbit	<1	<1	<1	<1
Mammalian herbivores (M123)	2.82	<1	<1	<1
Mammalian insectivores (M210)	7.13	1.74	1.19	<1
Mammalian insectivores (M210A)	6.91	1.68	1.16	<1
Townsend's western big-eared bat	19.34	<1	3.24	<1
Small-footed myotis	27.55	<1	4.62	<1
Long-eared myotis	23.84	<1	4.00	<1
Mammalian insectivores (M222)	40.45	12.24	11.65	4.7
Mammalian carnivore (M322)	<1	<1	<1	<1
Mammalian omnivores (M422)	16.39	2.45	<1	<1
Mammalian omnivores (M422A)	<1	<1	<1	<1
Reptilian insectivores (R222)				
Sagebrush lizard				
Reptilian carnivores (R322)				
Plants	3.94	2.95	1.34	<1

KEY

HQ >1 for only 1 WAG

HQ >1 for more than 1 WAG

No TRV data or was not assessed

Table C2-3-2. Status of WAG ERAs.

WAG	SLERA[b]	WAG ERA Status	Summary of Results for OU 10-04	Comments
1	C	C	I	WAG 1 feasibility study (FS) did not consider ecological receptors in remediation.[a]
2	C	C	C	WAG 2 FS did not consider ecological receptors in remediation.[a]
3	C	C	C	An additional screening was performed after WAG 3 ERA; however, these results should not effect the OU 10-04 ERA.
4	NP	D	I	None
5	NP	D	I	None
6	NP	X	I	WAG 6 sites have been grouped under WAG 10.
7	C	NP	I	A list of contaminants of potential ecological concern has already been compiled through an ecological screening exercise. WAG 7 ERA will not be performed. WAG 7 will be assessed qualitatively in the OU 10-04.
8	C	C	I	Performed using different methodology. May require additional steps to incorporate results in the OU 10-04 ERA.
9	C	C	I	An additional screening was performed after WAG ERA; however, these results should not effect the OU 10-04 ERA.
10	NP[c]	X	I	As discussed in this document.

C = Complete

D = Draft

I = In progress

NP = Not performed or will not be performed

X = Part of OU 10-04 WAGs 6 and 10 ERA

[a] For purposes of the OU 10-04 ERA objectives, this is not a concern. All retained contaminants of ecological concern from the WAG ERA will be considered for the OU 10-04 ERA, regardless of whether a particular contaminant was identified by the WAG as requiring an action to reduce risk (whether human health, ecological, or both). If the OU 10-04 ERA determines that a contaminant from a WAG site is contributing to risk to an ecological receptor, then the WAG project managers need to determine the appropriate action to ensure ecological receptors are protected. Potential action could include monitoring, remediation, or no action.

[b] The scope of the WAG-level efforts was modified and SLERAs are no longer produced for each WAG. This will not effect the final outcome of the OU 10-04 ERA since the WAG ERA supercedes the SLERA.

Table C2-3-3. Summary of WAG ERA data gaps.

Data Gap	Method to Fill
WAG ERAs for WAGs 4, 5, 7, and WAG 6 and 10 sites.	ERAs for WAGs 4, 5, and 7 will be conducted as part of the WAG Comprehensive RI/BRAs. The ERAs for WAGs 6 and 10 will be performed to support the OU 10-04 ERA Problem Formulation and will be presented in the OU 10-04 ERA.
ERA summary for WAGs 1, 4, 5, 7, 9, and WAG 6 and 10 sites	WAGs 1, 4, 5, 6, 9, and 10 ERA results will be summarized as discussed in Appendix D1. The WAG 7 ERA will not be performed at this time and only the initial screening will be discussed.
ERA summary for WAG 8	WAG 8 assessments were conducted using a different methodology. The results for WAG 8 will be included in the OU 10-04 assessment as a qualitative discussion.

C2-4. COMPILATION AND REVIEW OF EXISTING DATA

Several data gaps identified in the OU 10-04 Eco Tech Memo (INEL 1996) were designated to be filled through compilation and evaluation of existing data. These tasks represent major components of the problem formulation for the OU 10-04 ERA. The resulting data will be used in the ERA exposure assessment and to support GIS analyses and map production for risk characterization and interpretation. This section briefly describes each data gap and the process implemented to fill each and any remaining or newly identified data gaps.

C2-4.1 INEEL Species Distribution and Habitat

The overall objectives of the OU 10-04 ERA include determination and documentation of adverse effects to ecological receptors on an INEEL-wide scale. Receptors that are generally representative of ecological resources, as well as T/E and species of concern, will be evaluated as part of the assessment (see Subsection C2-5.3). Although the effects associated with exposure of protected species to contaminants are generally evaluated at an individual level, exposures for most wildlife species (e.g., game species) are more appropriately evaluated at the population level. A primary requirement for performing such evaluations is spatial and population data to support GIS interpretation of species distribution and extent of contaminant exposure. Compilation of these data to support the OU 10-04 ERA was previously identified as a data gap in the OU 10-04 Eco Tech Memo (INEL 1996).

The following general data types are required for characterizing and interpreting the spatial relationship of receptors to sources of contamination:

- Species distribution (which areas of the INEEL are used and/or inhabited)
- Contaminant extent and concentration
- Species density (number of individuals per unit area is required if impact analysis includes an estimate of the number of individual animals affected)
- Total INEEL population for each species of interest (only required for comparison of INEEL populations to regional populations for impact analysis [see Subsection C2-5.2]).

Species distribution data sets will be overlaid on contaminant extent and concentration data to estimate and interpret the extent of any contaminant-specific risk indicated during the assessment exposure modeling. Characterization of contaminant data is discussed in Subsection C2-4.2.

A three-step process, documented in Appendix D1 and briefly described below, was applied to develop a GIS interpretive map example to support evaluation of individual and population level risks:

1. INEEL specific wildlife studies and existing data sets were reviewed and those studies and/or data sets associated with wildlife distribution, density, or populations were identified. This step was generally focused on a selected group of wildlife species (based on draft endpoints, Subsection C2-5.3).

2. Data were extracted from the literature and converted to an ORACLE database to allow GIS interpretation. Existing data sets, including INEEL BBS and wildlife distribution

information already residing in the GIS system, were also incorporated. Specific data parameters vary somewhat among data sets; however, general parameters are as follows:

- Species taxonomic and/or common name
- Number and location of sighting(s) or telemetry signal reading(s)
- Vegetation associations or other habitat descriptors
- Reference document citation
- Study date.

Individual data sets are linked through a primary data set containing all INEEL species taxonomic and common names. The parameter definitions, data sets, and limitations are detailed in Appendix D1.

3. Data were combined with existing GIS vegetation, soil, and habitat data sets to produce draft spatial distribution and summary maps for several species of interest. The purpose of this step was to identify general distribution patterns and associate sightings and/or telemetry data with primary vegetation cover types. Because detailed habitat models and data are not currently available for most species, vegetation cover type will be used as a surrogate for general habitat features (see Appendix D1 for a draft example).

Finalized distribution maps will be overlaid on GIS data sets depicting contaminant concentrations and spatial extent (see Subsection C2-4.2) to characterize exposure for species of interest. GIS analytical tools will then be applied to estimate the portion of individuals and/or populations exposed for each species based on vegetation/habitat associations. Example GIS analyses have been conducted for several species.

Individual data sets have specific limitations that will be discussed in the OU 10-04 ERA. Some general limitations pertinent to the level and quality of assessment that can be supported by these data sets include:

- INEEL ecological data are not generally available in electronic or GIS compatible format. Most data sets created thus far have required data entry and/or alteration to create computer compatible files. Appendix D1 summarizes what has been done. Further data compilation will require substantial effort.
- Few long-term data sets exist (i.e., BBS, jackrabbit, raptor counts). Most data sets can be used to produce only rough estimates of resident or cyclic populations for many species.
- Census data are limited to a few species and the populations and activities of large animals are more often surveyed and more accurately estimated than those of small animals. Accurate location coordinates (i.e., telemetry or GPS data) are not available for most data sets.
- INEEL-wide distribution data have not been collected for most species. Validated habitat models are also not available for most species. Distributions for some species of interest must, therefore, be based primarily on vegetation associations and range maps of varying

scale and accuracy. Evaluations based on habitat associations have additional limitations and restrictions, which will be discussed in detail in the OU 10-04 ERA.

- INEEL GIS base maps (i.e., vegetation and soils) have not been assessed for accuracy.

Based on the assumption that current data limitations are acceptable for the ERA, remaining data gaps for characterizing INEEL species distributions and populations and proposed methods for filling those data gaps are summarized on Table C2-4-1.

C2-4.2 Characterization of Contaminant Extent and Concentration

GIS compatible data sets characterizing contaminant extent and concentration for areas outside WAG fences are in various stages of completion. These data sets have been primarily constructed from soil sampling data (primarily for radionuclides) collected as part of INEEL human health risk assessment activities. Contaminant concentration data collected as part of the environmental monitoring program (Jessmore et al. 1994) will also be evaluated and, where appropriate, included as part of the GIS analyses. These data sets have been used to delineate preliminary isopleths or assessment areas around individual WAGs, and will also be used to define the spatial extent and concentration levels that will be evaluated in the OU 10-04 ERA. Contaminant concentrations for aquatic sites will also be based on existing sample data. Existing data will be used primarily to finalize OU 10-04 assessment area(s), develop concentration profiles for OU 10-04 ERA assessment area(s), and create GIS maps.

Anticipated data gaps associated with characterizing contaminant extent and concentration are summarized in Table C2-4-2. The following limitations and assumptions apply:

- Contaminant extent and concentration will be developed from OU 10-06 and other available sampling data (primarily human health). Characterization data will be collected for ERA efforts only if determined necessary during the OU 10-04 ERA Problem Formulation.

- Characterization of contamination of the soil, sediment, and water in the Big Lost River drainage will be based on historic and process knowledge information. These sites are not expected to be contaminated and will be discussed qualitatively in the ERA.

- All areas of ecological concern have been identified and contaminant profiles will be developed only for assessment areas defined through previous sampling efforts.

Table C2-4-1. Summary of remaining data gaps for compilation of species distribution and population data.

Data Gap	Method to Fill
GIS maps and analyses for additional species of interest (to be determined by finalized assessment endpoint and receptors, see Subsection C2-5.3).	Conduct steps 2 and 3 of process described in Subsection C2-4.1 for other species to be evaluated in the ERA.
Species density estimates using INEEL/Regional data for species to be evaluated in ERA.	Compile relative density values from literature and GIS analyses (optional, see Subsection C2-5.2).
Verification of BBS data collection point coordinates.	Collect GPS locations from the field.

Table C2-4-2. Summary of remaining data gaps for characterizing contaminant concentration and extent.

Data Gap	Method to Fill
COPC list for OU 10-04.	Summaries from WAG ERAs will be used to develop a preliminary COPC list. This list will be refined (limited) as discussed in Appendix D.
Profiles and spatial extent for contaminants which have been characterized by sampling outside the WAG boundaries and for WAG 6 and 10 sites.	The OU 10-06 and ESRF data will be used to develop an assessment area outside of the WAG areas. Existing data collected for human health activities will be used to characterize the spatial extent and concentrations of contaminants at WAG 6 and 10 sites.
Profiles and spatial extent for OU 10-04 COPCs which have not been characterized by sampling outside the WAG boundaries.	No additional sampling will be performed to characterize contamination for ecological receptors. Contaminant concentrations and spatial extent will be extrapolated from similarly sampled contaminants (i.e., radionuclides to metals and organics).
GIS maps of the profiles and spatial extent of selected COPCs.	Data on the profiles and extent for OU 10-04 COPCs will be converted to GIS format.
Characterization of contaminant extent in soil, sediment and water in the Big Lost River drainage.	ESRF will collect data based on ER requirements. Based on historic and process knowledge information, these sites are not expected to be contaminated. This will be discussed in the ERA.

- Data in existing form can be converted to GIS format.
- Data from radionuclide concentration sampling can be used to extrapolate an contaminant concentrations in the same area.

C2-4.3 ESRF Data and Dose Reconstruction

The ESRF research performed on the INEEL since the 1970s has resulted in a collection of radionuclide concentration data for biota and soils. These data provide a valuable source of information about the actual dose that biota outside WAG facilities may have encountered. Due to the limited data to support the baseline ERA, these data are critical in evaluating past doses and spreading contaminants in the media (particularly soil). Dose reconstruction will consist primarily of evaluating the ESRF data (however, if other data is identified it will also be included in this effort). The information from these studies will provide input to the development of a GIS layer for dose and contaminate concentration. An initial evaluation of the ESRF studies can be found in the Appendix C of the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995).

GIS compatible data sets will be develop if appropriate. Development of any GIS data set will be coordinated and evaluated by a GIS expert. The dose reconstruction will be used with the population compilation to support an evaluation of the population exposure in the OU 10-04 ERA. Results of the compilation, summarization, and contaminant mapping are detailed in Appendix D.

The following steps will be used to fill this data gap:

1. The ESRF report summaries presented in Appendix C of the *Guidance Manual* (VanHorn et al. 1995) will be evaluated for accuracy and completeness.

2. Other ESRF reports will be evaluated as deemed appropriate. For example, studies documented in reports after the *Guidance Manual* was written will be evaluated.

3. The ESRF studies will be tabled and those that can be used in a dose reconstruction will be identified. Those that are not acceptable for use will also be listed and discussed.

4. Studies for dose reconstruction will be grouped by area, by study, and/or other evaluated criteria (there are multiple papers on different aspects of the same study). All studies will be evaluated in the ERA, but only those pertinent to WAGs 2 and 3 have been included as examples in this *Work Plan.*

5. Doses will be calculated from the documented levels in the biota as compared to toxicity reference values. Those levels that exceed acceptable tissue concentrations based on TRVs will be evaluated for source (i.e., some sources of contamination have been in remediation since the time of many of the ESRF studies).

The ESRF studies are focused on radionuclides, and it will be necessary to extrapolate metal concentrations in the biota from the radionuclide concentrations. All assumptions and uncertainties will be documented. Dose reconstruction values will be used to calculate GIS layers as appropriate. This will allow an evaluation of the dose experienced in the past by receptors at the INEEL. Comparisons will be made between more current (i.e., after remediation) values, and earlier values. Summaries of the data gaps are presented in Table C2-4-3.

Limitations and assumptions of the ESRF data and dose reconstruction are as follows:

- The reconstruction of exposure based on tissue concentrations in selected biota at the INEEL will be adequate to verify the exposure and foodweb modeling performed for the WAG ERAs and to support the refinement of the exposure modeling for the OU 10-04 ERA

Table C2-4-3. Summary of ESRF data and dose reconstruction data gaps.

Data Gap	Method to Fill
ESRF study evaluation and dose reconstruction for use in the OU 10-04 ERA.	The ESRF studies identified in Appendix C of the Guidance Manual will be evaluated further for use in the OU 10-04 ERA. A dose from radionuclides to receptors will be calculated and presented. The information, if possible, will be used in conjunction with the 1997 field sampling data to verify foodweb models used in the WAG ERAs and to refine these models for the exposure modeling used in OU 10-04.
GIS data sets maps of ESRF data summaries.	If appropriate the data available will be converted to the GIS format and entered into the GIS system.

- The necessary data to evaluate the ESRF studies for the OU 10-04 ERA is readily available either in a summarized form or entered on computer

- The statistical sampling and analysis rigor of the ESRF studies was adequate for the OU 10-04 ERA

- The ESRF studies can be used to extrapolate exposure to those COPCs and receptors of concern not sampled directly.

C2-4.4 EBSL and Exposure Model Parameter Values

Unlike human health, acceptable default values for ERA are not available. Input values for exposure/dose calculations are commonly obtained from the literature but these values must reflect the most current and site-specific information possible. A primary data gap identified in the Eco Tech Memo (INEL 1996) was the need to review and refine the ERA model input values used to calculate risk to ecological receptors. These input values represent three general groups of parameters: (1) toxicity reference values (TRV), (2) contaminant plant uptake factors (PUFs) and bioaccumulation factors (BAFs), and (3) receptor specific parameters including dietary composition (percent prey [PP], percent vegetation [PV], and percent soil [PS], body weight [BW], food and prey ingestion rate [IR], water ingestion rate [WI], exposure duration [ED], and site use factor [SUF]).

The goal of the phased ERA approach is to systematically eliminate sites and/or COPCs based on reducing the conservatism and uncertainty in each subsequent step of the assessment. Due to the number of sites and contaminants at the site. Ecological based screening levels (EBSLs) were developed to quickly screen contaminants as a first phase. EBSLs are risk-based values that can be used to determine whether the contamination levels in the media of concern may cause adverse effects. EBSLs consistently use conservative assumptions in their development and are designed to evaluate sites across the INEEL. During the next phase of the ERA, the retained contaminants are evaluated (by calculating dose) using similar models with more realistic values. As a result two data sets were used for risk calculations. Input parameters used to calculate EBSLs and dose equations are presented in detail in Appendix D2.

This section summarizes finalized defaults and assumptions for EBSL and dose models. In some cases, species-specific data were available (e.g., body weights); in others, professional judgment was used in compiling reasonable parameter values for a species or functional group. Literature, where available, was applied in the following order of preference (first listed being most beneficial):

1. INEEL

2. Idaho

3. Regional (sagebrush steppe in Washington, Oregon, Wyoming, Nevada and northern Utah)

4. USA

5. International.

A complete list of input parameter values, methods for selection and extrapolation to functional groups or individual species, and references from which information was extracted are also presented in Appendix D2, D3, and D4.

C2-4.4.1 TRVS

TRVs for specific contaminants were identified as a data gap in the Eco Tech Memo (INEL 1996). TRVs are critical to the risk assessment process. They are used primarily to establish the level of contaminant in the media of concern that will have no adverse effect on the receptor. TRVs are calculated specifically for each taxonomic class (e.g., Mammalia, Aves); it is not appropriate to extrapolate across classes. In the absence of actual toxicity studies, TRVs at the INEEL were primarily developed from the existing toxicity literature. These values will be updated and reviewed as new information becomes available, making TRV development a constant effort. Preliminary TRVs were developed for the INEEL in 1995. In 1997, these TRVs were reviewed by a toxicologist and revised using values and information from the literature search. These finalized TRVs apply to both EBSL and WAG ERA dose calculations. Appendix D4 documents the specific methodology for TRV development and lists finalized TRVs.

TRVs were calculated for the contaminants of concern and subsequent summaries of the contaminant toxicity, and fate and transport were written when the information was available. Because information on reptiles, amphibians, and invertebrates was scarce, TRVs could not be calculated. Most of the TRVs were calculated for mammalian species. Tasks needed to finalize this section include:

- Documentation of the TRV development process
- Documentation of the TRVs and the literature used to develop them
- Documentation of contaminant fate and transport.

The nonradiological contaminants identified at the INEEL, the availability of fate and transport publications for these contaminants, and the availability of avian, mammalian, and plant TRVs were reviewed during the WAG ERAs as indicated in Table C2-4-4. Where a TRV is missing, this information will be listed as an uncertainty in the assessment. As discussed in Appendix D4, TRVs for all radionuclides can be calculated. Data gaps remaining for TRVs are presented in Table C2-4-5.

C2-4.4.2 Plant Uptake and Bioaccumulation Factors

Development and refinement of PUFs and BAFs were discussed as a data gap in the Eco Tech Memo (INEL 1996). PUFs and BAFs developed from the available literature or calculated using allometric equations are used in the absence of site-specific data to estimate the concentration in either the plant or other biota (i.e., deer mouse) based on modeling the foodweb exposure. Contaminants that have BAFs and/or PUFs greater than 1.0 are generally bioconcentrators and the dose will be greater to the higher trophic levels. Contaminants that have BAFs and PUFs that are less than 1.0 are generally not bioconcentrators. Information on these parameters is very important in ERA modeling. Therefore, the literature values should, as strongly as possible, be focused on information specific to the environment and species at the site. The documentation of the approach for evaluation and use of PUFs and BAFs is presented in Appendix D3.

Table C2-4-4. WAG ERA TRV development status.

	Toxicity Reference Values			Descriptive Write-ups	
COPC	Mammalian	Avian	Vegetation	Toxicity	Fate and Transport
1,1-Dichloroethylene	X			X	X
1,1,1 Trichloroethane	X			X	X
1,1,2,2-Tetrachloroethane	X			X	X
1,1,2-Trichloro-1,2,2-Trifluoroethane					
1,2,4-Trichlorobenzene	X			X	X
1,4-Dichlorobenzene					
2-Butanone	X			X	X
2-Chlorotoluene	X			X	X
2-Hexanone					
2-Methylnaphthalene	X			X	X
2-Nitrophenol					
2-Propanol	X			X	X
2,3,7,8,-Tetrachloro dibenzodioxin	X	X		X	X
2,4-Dichlorophenoxyacetic acid	X			X	X
2,4-Dinitrotoluene	X			X	X
4-Chloroaniline	X			X	X
4-Methylphenol	X			X	X
4-Chloro-3-methylphenol (CMP)	X			X	X
Acenaphthene	X			X	X
Acetone	X			X	X
Acetonitrile	X			X	X
Acrylonitrile	X			X	X
Aluminum	X	X	X	X	X
Aluminum chloride	X			X	X
Aluminum hydroxide	X	X		X	X
Aluminum nitrate	X			X	X
Aluminum nitrate nonahydrate					
Aluminum sulfate		X		X	X
Ammonia	X				X
Anthracene	X			X	X
Antimony	X		X	X	X
Arsenic	X	X	X	X	X
Asbestos	X				X
Barium	X		X	X	X
Barium chloride	X				
Benzene	X			X	X
Benzine					

Table C2-4-4. (continued).

COPC	Toxicity Reference Values			Descriptive Write-ups	
	Mammalian	Avian	Vegetation	Toxicity	Fate and Transport
Benzo(a)anthracene	X			X	X
Benzo(a)pyrene	X			X	X
Benzo(b)fluoranthene (BbF)	X			X	X
Benzo(k)fluoranthene					
Benzo(g,h,i)perylene					
Beryllium	X		X	X	X
Bis(tui-n-butyltin)oxide	X	X			
Boron	X	X	X	X	X
Butyl alcohol	X			X	
Butylbenzylphthalate (BBP)	X			X	X
Cadmium	X	X	X	X	X
Calcium					
Carbon disulfide	X			X	X
Carbon tetrachloride	X			X	X
Cerium chloride	X			X	
Chloride	X			X	X
Chloroform	X			X	X
Chloromethane					
Chromium (III)	X	X	X	X	X
Chromium (VI)	X		X	X	X
Chrysene	X			X	X
Cobalt	X	X	X	X	X
Copper	X	X	X	X	X
Cyanide	X	X		X	
Decanal					
Dibenzofuran					
Dichlorodifluoromethane					
Di-2-ethylhexyl-phthalate (DEHP)	X			X	X
Diethyl phthalate	X			X	X
Dimethyl phthalate					
Di-n-butylphthalate	X		X	X	X
Di-n-octylphthalate	X			X	X
Ethanol (Ethyl alcohol)	X			X	
Ethylbenzene	X			X	X
Fluoranthene	X			X	X
Fluorene	X			X	X
Fluoride	X	X		X	X
Formaldehyde	X			X	
Hexachlorobenzene	X				

Table C2-4-4. (continued).

COPC	Toxicity Reference Values			Descriptive Write-ups	
	Mammalian	Avian	Vegetation	Toxicity	Fate and Transport
Hydrazine	X				
Hydrofluoric acid	X			X	
Indeno(1,2,3)pyrene					
Iron			X		
Lead	X	X	X	X	X
Magnesium	X			X	
Magnesium fluoride					
Manganese	X	X	X	X	X
Mercury (Inorganic)	X	X	X	X	X
Mercury (Organic)	X	X	X	X	X
Methanol (Methyl alcohol)	X			X	
Methyl isobutyl ketone	X			X	X
Methylene chloride	X			X	X
Molybdenum	X		X	X	X
n-Propylbenzene	X			X	X
Naphthalene	X			X	X
Nickel	X	X	X	X	X
Nitrate	X	X		X	X
Nitric acid	X				
Nitrite					
Orthophosphate					
PCBs – Aroclor 1254	X	X	X	X	X
PCBs – Aroclor 1260	X		X	X	X
Phenanthrene					
Phenol	X			X	X
Potassium chloride	X			X	X
Potassium hydroxide	X			X	X
Potassium nitrate	X			X	X
Potassium phosphate	X			X	X
Potassium sulfate	X			X	X
Propionitrile					
Pyrene	X			X	X
Selenium	X	X	X	X	X
Silver	X		X	X	X
Sodium	X			X	X
Sodium chloride	X			X	X
Sodium cyanide	X			X	X
Sodium hydroxide	X			X	X
Sodium nitrate	X	X		X	X

Table C2-4-4. (continued).

COPC	Toxicity Reference Values			Descriptive Write-ups	
	Mammalian	Avian	Vegetation	Toxicity	Fate and Transport
Sodium phosphate	X			X	X
Sodium sulfate					
Strontium	X			X	X
Sulfate	X	X		X	X
Sulfide					
Sulfuric acid	X			X	
Terphenyl	X			X	
Tetrachloroethylene	X			X	
Tetrahydrofuran	X			X	X
Thallium	X	X	X	X	X
Tin	X		X	X	X
Toluene	X		X	X	X
Total Petroleum Hydrocarbon				X	X
Tributyl phosphate	X			X	
Trichloroethylene (Trichloroethene)	X			X	X
Trimethylopropane-triester	X			X	
Uranium	X	X		X	X
Vanadium	X	X	X	X	X
Vinyl acetate					
Xylene	X			X	X
Zinc	X	X		X	X
Zirconium	X			X	

X = Indicates the availability of a TRV or fate and transport documentation.

Table C2-4-5. Toxicity reference value data gaps.

Data Gap	Methodology to Fill
TRVs for previously unidentified radionuclides.	Fill using procedure presented in Appendix D4.
TRVs that are verified and well documented. As new literature toxicity data becomes available, this information should be incorporated into the INEEL TRV.	Incorporate the new information using procedure presented in Appendix D4.
TRVs that are poorly verified and documented or incomplete (i.e., no avian data). As new literature toxicity data becomes available, this information should be incorporated into the INEEL TRV.	Incorporate the new information using procedure presented in Appendix D4.

Assumptions applied to the application of PUFs and BAFs in both the EBSL and dose calculations are summarized in Table C2-4-6. Where no contaminant information could be located, BAFs and PUFs were defaulted to 1.0.

As discussed in Appendix D3, the approach for identifying appropriate PUFs and BAFs was similar—the literature values were examined, the assumptions were documented, and data and/or information that would provide more site-specific information was examined. This information was compiled and the most appropriate value for each contaminant and functional group was selected. This selection was based on a somewhat subjective criterion discussed in Appendix D, which also presents the values used in the risk assessments.

A great deal of uncertainty is inherent in the use of literature values. Limited site-specific biotic data collected proximal to soil will be used to verify the uptake values for metals and radionuclides. Additionally, the results of a recent LDRD—Project No. 2342, "An Approach to Estimating Plant Contaminant Uptake for Risk Assessment Exposure Modeling," might provide information to assist in verifying the literature values used. This information will need to be compiled and a discussion on how the BAFs and PUFs were updated or re-evaluated based on this new information will need to be completed. Table C2-4-7 presents the associated data gaps.

C2-4.4.3 Receptor Specific Parameters

Preliminary screening (i.e., SLERA) input values for the parameters (PV, PP, PS, IR, WI, BW, ED, and SUF) were reviewed and revised using data taken from the literature. Parameter defaults and assumptions for EBSL soil and sediment, EBSL drinking water, and WAG ERA dose calculation models are given in Table C2-4-8. Receptor specific parameter tasks have been finalized for the WAG ERAs; however, development of the refined receptor diet for the OU 10-04 ERA may be required as shown in Table C2-4-9.

Finalized input values compiled for functional groups and individual species for the EBSL model are summarized in Appendix D1. EBSL values were calculated for all groups and T/E species. Finalized input values compiled for functional groups and individual species for WAG ERA dose models are also summarized in Appendix D1. A subset of functional groups and species considered representative of all groups is assessed in the WAG ERAs. There are no data gaps remaining for this task.

Table C2-4-6. Summary of the methodology and assumptions used to develop PUFs and BAFs for EBSLs and dose calculations.

	EBSL Soil/Sediment			EBSL Water			WAG ERA Dose for Soil	
Parameter	Metals[a]	Radionuclides[a]	Organic Compounds	Metals	Radio-nuclides	Organics	Nonradionuclide	Radionuclides
PUF	For EBSL values this was defaulted to 1.0 if not higher.	For EBSL values this was defaulted to 1.0 if not higher.	Allometric equations from Travis and Arms (1988) were used to calculate PUFs. Defaulted to 1.0 if calculated value was not higher	NA	NA	NA	Literature values were examined as shown in Appendix D2 and D3.	Literature values were examined as shown in Appendix D2 and D3.
BAF	For EBSL values this was defaulted to 1.0 if not higher.	For EBSL values this was defaulted to 1.0 if not higher.	Allometric equations from Travis and Arms (1988) were used to calculate BAFs. Defaulted to 1.0 if calculated value was not higher	NA	NA	NA	Literature values were examined as shown in Appendix D2 and D3.	Literature values were examined as shown in Appendix D2 and D3.

a Literature values were examined as shown in Appendix D3.
NA—Not applicable. EBSLs for water ingestion were not calculated.

Table C2-4-7. PUF and BAF data gaps for OU 10-04.

Data Gap	Method to Fill
PUFs and/or BAFs for previously unidentified COPCs.	Literature search and/or use of allometric equations to determine factors as discussed in Appendices D2 and D3.
Comparison of 1997 biota sampling data to literature values for PUFs and BAFs used in the WAG ERA.	1997 biota sampling data will be evaluated and compared to literature values. This will be documented in the OU 10-04 ERA.
Comparison of 1995/1996 LDRD plant uptake data to literature values used in the WAG ERAs.	LDRD study results will be evaluated and compared to literature values. This will be discussed in the OU 10-04 ERA.

Table C2-4-8. Parameter defaults and assumptions for EBSL and dose calculations.

Parameter	EBSL Soil and Sediment Calculations	EBSL Water Calculations	WAG ERA Dose Calculations
PV	Herbivores assumed to be 100 – PS Insectivores assumed to be 0 Carnivores assumed to be 0 Omnivores % from literature – PS/2.	NA	S/A EBSL
PP	Herbivores assumed to be 0 Insectivores assumed to 100 – PS Carnivores assumed to be 100 – PS Omnivores % from literature – PS/2.	NA	S/A EBSL
PS	The highest value (i.e., greatest exposure) was selected from species within functional group. Individual species were evaluated using values as presented.	NA	S/A EBSL
IR	The largest IR/BW ratio was selected from the species within each functional group.	NA	S/A EBSL
WI	N/A	Ingestion rates were calculated from allometric equations (Environmental Protection Agency [EPA] 1993). The largest WI/BW ratio was selected from species within each functional group.	Allometric equations
BW	The largest IR/BW ratio was selected from species within each functional group.	The largest WI/BW ratio (smallest BW) was selected from species within each functional group.	The largest IR/BW or WI/BW ratio was selected from species within each functional group.
ED	A default value of 1 was used for estimating EBSLs.	A default value of 1 was used for estimating EBSLs.	The largest ED value was selected from species within each functional group.
SUF	A default value of 1 was used for estimating EBSLs.	A default value of 1 was used for estimating EBSLs	The largest SUF value was selected from species within each functional group.

S/A = Same as.

NA = Not applicable.

Table C2-4-9. Receptor specific parameter data gaps.

Data Gap	Method to Fill
Refined receptor diet for OU 10-04 ERA.	Literature.

C2-5. ERA METHODOLOGIES

This section describes data gaps that exist in the ERA methodology. General OU 10-04 ERA pathway and exposure modeling data gaps are described in Subsection C2-5.1. Subsection C2-5.2 discusses spatial and temporal modeling data gaps that could affect the OU 10-04 ERA approach.

C2-5.1 Pathway and Exposure Modeling

The development of inhalation and dermal exposure models, and the refinement of foodweb models, were identified as data gaps in the Eco Tech Memo (INEL 1996). As discussed in the next sections, assessing existing data and using professional judgment to include a qualitative or quantitative assessment for these exposure routes will fill these data gaps. Where quantitative assessment is required, models suggested by the Environmental Protection Agency (EPA) will be incorporated (EPA 1993). The data gaps associated with OU 10-04 exposure model evaluation and selection are discussed briefly in Subsection C2-5.1.3.

C2-5.1.1 Dermal Exposure

Although the EPA (1992a) guidance is human health specific, the basic information is appropriate for use with terrestrial ecological receptors. The EPA (1992a) guidance states that there are three dermal exposure routes that should be assessed: contaminated water, soil, and vapor. It is important to realize that the actual exposure to contaminants in water and soil/sediment may be more or less limited for ecological receptors due to behaviors such as dust bathing or because of the possible trapped air layers between the feathers, fur, or skin.

The EPA (1992a) demonstrated that dermal absorption of vapors is negligible compared to other pathways (i.e., inhalation) for all classes of contaminants; this can also be assumed for ecological receptors. Dermal exposure to water (such as swimming and/or bathing) is anticipated to be limited for most species at the INEEL, due to limited exposure to water. Possible scenarios include exposure to contaminated water from industrial waste water ponds and sewage lagoons, where aquatic birds such as mallards may land and be exposed. ESRF studies have documented the amount of time these species spend at such sites. Unless the evaluation of these studies indicates otherwise, only exposure to contaminated soil will be evaluated.

The approach for calculating the exposure has also been examined and identified. As with human health, skin-specific factors can affect the absorption of a contaminant including site of application or exposure, age of skin, condition of skin, hydration, circulation, temperature of the skin, and other miscellaneous factors. Unlike human health, however, these factors are also compounded by species differences in physiology as well as feeding and nonfeeding habitats. To estimate dermal exposure it is necessary to know surface area, frequency and duration of exposure, body weight of the receptor of concern, and the absorption fraction (ABS) of the contaminant.

To assess dermal dose from exposure to soil, parameters available in *EPA Dermal Guidance* (EPA, 1992) will be used in equation calculations. Initially, the ERA will follow the human health assessments and only organic contaminants will be evaluated. As with the human health assessment the ABS for organic compounds will be assumed to be 1.0. The dermal factors for metals were evaluated as part of the human health risk assessment and appeared too conservative relative to ingestion. Ecological receptors may not have similar conservatism and these assumptions will be evaluated during the assessment process.

A discussion of the factors that determine the degree to which an animal may absorb contaminants through direct contact with its skin are included in *the EPA Wildlife Exposure Handbook* (EPA, 1993). The allometric equations presented in this document will be used to calculate the surface areas of animals.

The following additional tasks need to be performed:

- Identify the organic compounds and receptors to be evaluated
- Assign values to contaminant/receptor-specific input values to be used in calculations
- Determine if additional contaminants (other than organic compounds) need to be evaluated
- Document WAG and OU 10-04 levels assumptions.

Table C2-5-1 presents the data gaps associated with dermal exposure.

C2-5.1.2 Inhalation Exposure

Inhalation exposure can occur from either inhalation of volatiles or dust. Carlsen (1996) found that inhalation of volatile organic compounds (VOCs) may be a significant exposure route for fossorial (i.e., burrowing) vertebrates. Based on this study, it has been decided that inhalation will be assessed for VOCs and other contaminants that may have potential for adverse effects from inhalation. This effort will be limited and complicated by the availability of toxicity values based on inhalation studies and the problems inherent in extrapolating from species to species.

Tasks that have been accomplished include identifying a method to calculate the exposure and parameters of concern. Since the concentrations of contaminants in the subsurface burrow-space air is not generally available, the exposure equation presented (Carlsen 1996) will be used to calculate the concentration from the subsurface soil concentration. This equation assumes equilibrium of the burrow air with the concentrations of the contaminant in the sorbed and aqueous phases in the subsurface soil. The inhalation rates for mammalians and nonpasserine avian species will be calculated using the allometric equations in the *EPA Wildlife Exposure Handbook* (EPA 1993).

The following additional tasks need to be performed:

- Identify the COPC and receptors to be evaluated
- Assign values to equation parameters

Table C2-5-1. Data gaps associated with dermal exposure.

Data Gap	Method to Fill
Dermal exposure assessment approach evaluated and documented	Presented in Appendix D
Contaminant/receptor specific input values identified	Based on the approach presented in Appendix D, COPC/receptors will be identified as part of the ERA process and will be filled using literature values

- Examine the literature for an allometric equation for inhalation rate for passerines
- Document the assumptions made at the WAG and OU 10-04 levels.

Appendix D presents the methods to assess the exposure and some of the parameters for this evaluation in more detail. Table C2-5-2 presents the data gaps associated with inhalation exposure.

C2-5.1.3 Exposure Model Evaluation and Selection

The Eco Tech Memo (INEL 1996) lists the need to conduct exposure model evaluations and to select an exposure model for the OU 10-04 RI/FS as a data gap. The major pathways and routes of exposure have already been identified as part of the ERA process at the INEEL (Appendix D1, Attachment 2). As discussed in Appendix D1, these will provide the basis for the OU 10-04 ERA exposure assessment and include surface and subsurface soil and surface water pathways.

Two main sources of uncertainty are inherent in calculating exposure using a model: the data input to the model and the model itself. The 1997, biotic sampling was focused on determining if the modeling used in the WAG ERAs was appropriate. Exposure using the ESRF data will be reconstructed as discussed in Subsection C2-4.3. Both these evaluations will support the verification and possible refinement of existing models, inclusion of additional models, and/or revision of input parameters. It is possible that a more realistic and defensible risk assessment could be developed by refining the model and/or input parameters. Table C2-5-3 states the data gaps associated with exposure model evaluation.

Table C2-5-2. Data gaps associated with inhalation exposure.

Data Gap	Method to Fill
Dermal exposure assessment approach evaluated and documented.	Will be presented in the OU 10-04 ERA
Contaminant/receptor specific input values identified.	Based on the approach presented in the OU 10-04 ERA. COPCs and receptors will be identified as part of the ERA process and will be filled using literature values.

Table C2-5-3. Data gaps associated with exposure models.

Data Gap	Method to Fill
Pathway and exposure modeling verification.	Evaluation of ERSF data and 1997 sampling data to develop biotic tissue concentrations (exposure) for sampled receptors and contaminants. This information will be used to verify the foodweb and exposure models used in the ERA process. The results of this evaluation will be incorporated into the risk assessment as appropriate.
Refined receptor diet for OU 10-04 ERA.	See Subsection C2-4.4.3.
Evaluate TRV development methodologies to assess the value of using a less conservative or different approach.	Discussion of various TRV development methodologies and their limitations and uncertainties.

As discussed in Subsection C2-4.4, input values and assumptions for the exposure model parameters for the WAG ERAs have been comprehensively evaluated and are documented in Appendix D3. Additional refinement in the dietary components for the OU 10-04 ERA can be accomplished through further literature examination. This will be performed only if deemed necessary based on the final model requirements.

The exposure assessment is used in the risk assessment process to evaluate the potential exposure to receptors in the absence of actual data (i.e., tissue concentrations in the biota). This exposure is then compared to TRVs for receptors of concern to determine potential effects using a hazard quotient. There is a great deal of uncertainty involved in the development and derivation of TRVs. As discussed in detail in Appendix D4, the TRVs for assessing nonradionuclides at the WAG ERAs were developed using a method (Ludwig et al. 1993) agreed upon in the early stages of the ERA process at the INEEL. Based on emerging ERA discussions this approach may be too conservative. It is possible that some of the uncertainty and conservatism may be limited with TRVs developed using another method (i.e., the body weight adjustment method used by Oak Ridge National Laboratory [Sample et al. 1996]). The limitations and uncertainties of these methods will be summarized to the agencies. A decision will then be made on which method to utilize.

Limitations and assumptions associated with this effort include:

- The data available will be adequate to verify or modify the current exposure models used for the OU 10-04 ERA.
- Literature data will be available to use for refinement of the dietary components.

C2-5.2 Spatial and Temporal Scale for OU 10-04

A primary component of the problem formulation for an ERA is to define the spatial and temporal scale for ecological resources to be assessed. Finalizing the definitions and assumptions associated with spatial and temporal scales for the OU 10-04 ERA was defined as a data gap in the Eco Tech Memo (INEL 1996). Definitions and assumptions are discussed below.

C2-5.2.1 Spatial Scale

The OU 10-04 ERA will encompass only the area within INEEL boundaries. No regional issues (i.e., regional is considered the large geographic area that has natural boundaries important to ecological concepts) beyond the INEEL boundary will be addressed unless evidence of off-Site contamination is found. If risk to INEEL ecological resources were shown, interpretation of that risk in terms of potential impact to regional resources would require off-Site data for comparison. For example, if a significant portion of an INEEL population is shown to be at risk, and that population represents a significant portion of the entire regional population, the ecological importance is elevated and may affect risk management decisions. The need for off-Site population and density data for species to be evaluated in the ERA represents a new data gap. Table C2-5-4 details a summary of these data gaps.

C-5.2.1.1 Terrestrial. The OU 10-04 ERA will evaluate terrestrial ecological receptors within the boundaries of the INEEL. Spatial areas of contamination representing potential exposure to ecological receptors across the INEEL assessment areas will be defined primarily by human health sampling data (see Subsection C2-4.2). Risk, if shown, will be interpreted at a population level using spatial

Table C2-5-4. Summary of data gaps for OU 10-04 spatial and temporal scale.

Data Gap	Method to Fill
Finalized 10-04 contaminant extent and concentrations	See Subsection C2-4.2
Species density and regional population data	Literature (no plan to fill)
Contaminant characterization for INEEL natural surface water systems	Sampling (no plan to fill)

distribution of species/habitat associations (see Subsection C2-4.1) within the assessment areas and INEEL-wide.

C-5.2.1.2 Surface Water. Contaminant characterization for major INEEL watercourses, including the Big Lost River and Birch Creek drainages, has not been performed and will not be quantitatively assessed in OU 10-04. Evaluation of INEEL aquatic receptors will be limited to those associated with WAG facility sewage disposal and industrial waste ponds. The home range for aquatic receptors will be assumed to be restricted to the area of individual ponds.

C-5.2.1.3 Groundwater. No pathway from groundwater to ecological receptors exists on the INEEL. Exposure to groundwater will not be quantitatively evaluated in the OU 10-04 ERA.

C2-5.2.2 Temporal Scale

Current conditions will be evaluated in the OU 10-04 ERA. No future scenarios will be included in the assessment. The current scenario assessed should be bounding for ecological receptors living in the area in the future. One exception can be buried waste. Risk at buried waste sites may change over time as contamination is transported to the surface. However, most buried waste sites have been assessed as if the waste was more available to ecological receptors and this should also be bounding. Duration of receptor exposures are currently reflected by TRV, SUF and ED exposure model input values and may be refined for the OU 10-04 ERA exposure models to more accurately reflect temporal exposure patterns (see Subsection C2-5.1.3).

C2-5.3 OU 10-04 Assessment Endpoints

For the OU 10-04 ERA, assessment and measurement endpoints will be defined using EPA criteria including social and biological relevance, susceptibility to the contaminants, and accessibility to prediction and measurement (EPA 1992a). Developing appropriate endpoints is primarily a systematic exercise in combining INEEL-specific regulatory, societal, and ecological requirements to produce a suite of assessment endpoints that will produce the information and results required from the assessment. The goal is to preferentially select endpoints that specifically address INEEL contaminant issues and most or all of the major EPA criteria.

The following endpoint selection process (Steps 1–4) has been developed to provide a systematic (and less subjective) method for identifying and selecting appropriate assessment and measurement endpoints for the OU 10-04 ERA. The selection process is discussed in detail in Appendix D1, Attachment 3.

1. All species and ecosystem components encompassing INEEL ecological resources have been combined into a series of functional groups (VanHorn et al. 1995). Function grouping allows all potential INEEL ecological receptors to be evaluated. These functional groups have been further screened to produce a comprehensive list of individual species and

communities that have the best potential for serving as OU 10-04 assessment endpoint species or supporting the assessment of a higher-level endpoint. The screening criteria for reducing the list of individual INEEL species and components to those with highest potential for serving as OU 10-04 assessment endpoints include the following:

- All wildlife functional groups are represented except those in which all group members are migratory. Assessment of resident species and populations is assumed to represent maximal potential exposure and includes all wildlife functional groups, T/E and species of concern, plants, and insects inhabiting the INEEL. Migratory or incidental species present at the INEEL for shorter times are considered on a contaminant by contaminant basis for cases where risk is shown for resident species.

- All T/E and species of concern assessed at the individual and population levels.

- Resident and common species serve as potential surrogates for other functional groups.

2. Socioeconomic and ecological resources (natural resources) to be protected have been compiled based on the presented methodology (Wyant et al. 1996, Wyant et al. 1995). INEEL natural resources have been identified and categorized in terms of their current potential economic and social values. Defining INEEL natural resources in terms of ecosystem values, goods, and services appears to be a viable concept for recognizing differing trustee interests and expectations and to aid coming to agreement on appropriate endpoints. Other natural resource valuation systems and concepts could also be incorporated to refine and better define INEEL products or benefits to be evaluated. Products and benefits have been related to specific individual or groups of species, communities, or other resource attributes that represent or affect the product or benefit in question.

3. A suite of ecological assessment endpoints based on relevance to OU 10-04 contaminants and other endpoint criteria will be developed by screening the candidate endpoint list developed in Steps 1 and 2 against a list of contaminant specific and general criteria. Appendix D1 summarizes the OU 10-04 assessment endpoint selection criteria developed around regulatory, societal, and ecological issues defined in terms of current options for INEEL.

   Each candidate endpoint will be evaluated for its applicability on a contaminant-by-contaminant basis and screened through the contaminant pathway analysis to verify potential for exposure. Additional contaminant specific criteria include (a) whether the candidate endpoint is known to be sensitive and/or may be appropriate for assessing those contaminants that bioaccumulate or bioconcentrate, (b) availability of high quality toxicity and/or biological data or INEEL specific data, and (c) whether the candidate has potential to serve as either an indicator of exposure or effects.

4. The resulting suite of endpoints, compiled to represent all ecologically, socially, and regulatory relevant issues and based on INEEL contaminant issues to be addressed, will be prioritized for inclusion in the assessment using criteria reflecting scientific and regulatory requirements, stakeholders expectations (i.e., social, cultural), and budget and schedule. This allows focus to be placed on those endpoints most critical to the assessment and, in the case where all cannot be assessed, to identify the ones that may be deferred, qualitatively

assessed, or otherwise addressed. A primary data gap associated with the development of finalized assessment endpoints is the completion of the WAG ERAs and a summary of the results, shown in Table C2-5-5.

C2-5.4 Soil Fate and Transport

COPCs identified by summarizing the results of individual WAG ERAs will be screened and ranked to produce the suite of COPCs that will ultimately be included in the OU 10-04 analysis (see Section C2-3). These COPCs are anticipated to be primarily associated with the surface soil pathway. Fate and transport data and information specific to INEEL soils can be used qualitatively (and in some cases quantitatively) to more accurately model contaminant movement through the food chain. This information has not been compiled in detail for some contaminants and remains as a data gap until a finalized list of COPCs is produced for the ERA (Table C2-5-6). INEEL specific fate and transport for soil borne contaminants driving the OU 10-04 ERA can then be compiled. Those data will be incorporated in dose calculations performed for OU 10-04 receptors.

Table C2-5-5. Summary of assessment endpoint data gaps.

Data Gap	Method to Fill
Exposure Assessment	
Finalized contaminant extent (assessment area) and concentration maps	Complete evaluation of existing soil and sediment data (see Subsection C2-4.2)
Description of ecological setting	Finalize assessment area (see Subsection C2-4.3)
Determination of presence of rare and endangered species	Complete biological surveys for WAG 6, 7, 8, and 10 (see Subsection C2-2.1)
Determination of exposure pathways	Finalize COPC list (see Section D1-2-2)
Hazard Identification	
Evaluation of new and existing data	See Section C2-4
Final COPC list for OU 10-04	Complete WAG ERAs and summarize results (see Section C2-3)
Receptor identification	Finalize COPC list (see Section D1-2-2)

Table C2-5-6. Summary of data gaps for contaminant fate and transport in soils.

Data Gap	Method to Fill
INEEL-specific fate and transport information for COPCs	Literature
Finalized COPC list	WAG ERA summary (see Section C2-3)

C2-5.5 Aquatic Foodweb

A data gap identified as part of the 1997 sampling effort (FWS letter 1997) was the development of an aquatic foodweb to support both WAG level and OU 10-04 assessments. A draft INEEL aquatic foodweb representing the linkages between ecological receptors and facility waste disposal and industrial ponds is presented in Appendix D1 Attachment 2. The foodweb was constructed to support characterizing the surface water pathway and exposure routes for aquatic receptors:

- Water and sediment → vegetation and benthic invertebrates → air- and water-feeding secondary consumers → tertiary consumers

Water ingestion through drinking is accounted for at all trophic levels through allometric equations implemented in the exposure modeling. Trophic linkages were developed primarily from INEEL literature. Only major dietary linkages between functional groups are represented in this preliminary model, and species in bold represent those for which dietary information specific to the INEEL (or similar local and regional areas) exist. Functional groups have been combined to allow simplified graphical depiction, and only the most common residents and T/E or species of concern are presented as group representatives. A more detailed evaluation of dietary data for aquatic species will be included in the OU 10-04 ERA. No data gaps associated with development of the aquatic foodweb remain to be filled for the OU 10-04 ERA (Table C2-5-7).

Table C2-5-7. Summary of data gap for INEEL aquatic foodweb.

Data Gap	Method to Fill
No data gaps remain.	NA

C2-6. STAKEHOLDERS AND AGENCY COMMENTS

Stakeholders and agency comments and available meeting minutes were reviewed for comments to documents supporting ERA work at the OU 10-04 level. This includes the Eco Tech Memo (INEL 1996) and the FSP. The comments and the INEEL responses and actions are listed in Table C2-6-1.

Stakeholders and agency comments were also reviewed for each of the WAG ERA activities. This includes both the WAG work plan and the Comprehensive RI/BRA or RI/FS. These comments and the INEEL responses and proposed actions are listed in Table C2-6-2.

Table C2-6-1. Summary of OU 10-04 comprehensive comment review.

Comment Reference	Comment Number	Comment/Response	Proposed Action
Technical Memorandum for the Approach and Data Gap Identification for OU 10-04 Site-wide Ecological Risk Assessment (Draft)	2	A reviewer noted that the report is lacking in a discussion as to how the information generated will be used in making risk-based decisions regarding remedial action at the WAG and Site Level. The author responded by including a paragraph stating the two paths for ERA results are (1) as information into WAG-specific RODs, and (2) use in the OU 10-04 ERA.	The response to this comment needs to be considered in discussions of how the results will be used for WAGs that are past the ROD stage by the time the OU 10-04 ERA results are available.
Independent review committee (IRC) Comments, 1/10/96	3	In order for decision-makers to reach informed consensus on the ERA approach, there should be some idea of cost and schedule. The author responded that cost would be included in the next step to this process and that the document states that cost is the bottom line, minimum, and that the ERA methodology proposed is the cheapest approach possible recognizing this may not be consistent with other sites.	WAG 10 needs to determine when and where costs will be presented.
	9	Several reviewers noted the need to be consistent with use of OU 10-04 ERA *and the Sitewide ERA and when referring to the OU 10-04 RI/FS* use "the OU 10-04 Comprehensive RI/FS."	The ERA performed for the INEEL *will be referred to as the "OU 10-04"* ERA in the OU 10-04 RI/FS.
	60	A reviewer requested a breakdown of elements in the ERA process that recognizes that the different functions of the many elements would be more informative by distinguishing between the levels of effort employed in the different ERA phases. The authors agreed to incorporate this comment into the text.	In the problem formulation of the OU 10-04 Comprehensive RI/BRA, the problem formulation section should be broken down as it was in the technical memorandum.
	67	A reviewer noted that the EBSL discussion was confusing, and stated the EBSL is not an estimate of maximum exposure; it is the concentration below which none of the species in the functional group should suffer an adverse consequence.	A conscious effort needs to be made when discussing EBSLs and that it is clear what the EBSL represents.
	109	A reviewer requested using another term besides hazard quotient for the quotient dose and toxicity reference value, stated that although this HQ is analogous to the human health HQ, there is great potential for confusion in the RI/FS.	A determination needs to be made whether to use the term HQ in ecological discussion.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
Draft for OU 10-04 Comprehensive Statement of Work (SOW) (Nov. 1996), Groundwater Strategy (Nov. 1996) and Ecological Risk Assessment Technical Memorandum (May 1996).	1a) Site-wide/ System Analysis to Support Risk Assessment	The Department of Environmental Quality (DEQ) requested information on any other state restrictions besides those for T/E or species of concern (formerly Category-C2), and asked if there were distribution maps available for these species. WAG 10 responded by stating that all known restrictions on T/E or species of concern have been identified and that maps are currently being developed as part of the OU 10-04 work plan preparation.	WAG 10 needs to be prepared to present these maps in the Work Plan if requested.
IDHW/DEQ Comments, March 1997	1b) Site-wide/ System Analysis to Support Risk Assessment	DEQ asked "how much understanding of habitat use exists i.e., have habitat use surveys been conducted to assist in focusing ecological risk efforts." WAG 10 responded stating that the Foundation has a body of work concerning these issues and much of the information has been compiled and assessed in the risk assessment framework contained in the Guidance Manual.	Discussion as to the depth of available information needs to be presented in the Ecological Data Gap Report and the Work Plan, where appropriate.
		DEQ asked if there are species on-site that migrate from one area of contamination to another. WAG 10 responded stating was that there are species that use multiple areas of contamination and migrate off-site.	This comment needs to be considered in the OU 10-04 RI/FS.
		DEQ asked what population level information was available on migratory species. WAG 10 responded that breeding bird surveys, game counts, and other studies would be compiled as part of OU 10-04. This information would be entered into the GIS system to supply an overall input to the risk assessment.	Determine where the compiled breeding bird surveys, game counts, and other studies will be presented in the OU 10-04 comprehensive evaluation.
		DEQ asked, based on the existing information, whether the components of the ecosystem which will be the main focus of the conceptual site model (CSM) and OU 10-04 ERA, be identified. DEQ also asked that based on existing information, can the receptors exposed via any particular exposure route be identified and endpoints selected. The response was that WAG 10 is still in the problem formulation stage of the OU 10-04 ERA and that FY-97 sampling results will provide input to answering this concern. The response also stated that exposure routes and potential species present at these routes have been identified, but sampling results will give an indication of whether these are complete exposure routes.	After results of the sampling are obtained, the concerns posed by DEQ need to be evaluated. If the concerns can not be answered additional data gaps may be identified.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
IDHW/DEQ Comments, March 1997 (continued)		DEQ asked if endpoints have been established for each WAG and then selected again for the INEEL-wide ERA. WAG 10 responded that assessment endpoints have been identified at the WAG level, and endpoints will be established at the INEEL-wide ERA level based on the recent EPA guidance.	In the presentation of endpoints in the Work Plan for OU 10-04 this comment needs to be considered.
	1a) SOW	DEQ requested assumptions that supported a statement in the SOW that it is not anticipated that WAGs 6 and 10 facilities evaluated as part of the BRA will have any impact on the risk at OU 10-04 sites. WAG 10 responded by stating that the statement is based on knowledge of past releases at EBR-1 and the STF. Releases at these facilities were localized and are not expected to affect the entire INEEL. It should be noted that EBR-1 and the Security Training Facility (STF) are discussed separately because they are currently operational. This discussion in the SOW is only meant to imply that these two operational facilities are not expected to affect site-wide risks, not that there are no WAGs 6 or 10 releases that could impact the INEEL.	In the co-located (i.e., facility assessment) discussion this response needs to be considered. Two new sites have been added at STF (STF-01 and STF-02) and will be evaluated in the OU 10-04 comprehensive RI/FS.
		DEQ asked if complete ERAs were being done for each WAG and if the SLERAs were compatible and available. WAG 10 responded by stating that each WAG (with the exception of WAG 8) will have an ERA performed using the same methodology to provide easier compilation of the results. All assessments will not be available for the Work Plan but the uncertainties with each will be identified and documented.	
		DEQ asked if contaminants having high potential to bioaccumulate/bioconcentrate will be retained through WAG-level ERAs even if they don't pose risk. WAG 10 responded by stating if a contaminant has been shown to have a high bioaccumulation in an arid environment, it was modeled as such. However, if the contaminant was eliminated it would not be assessed at the INEEL-wide level. Literature values used to model contaminant movement through the biota will be verified during the OU 10-04 ERA sampling proposed this year.	WAG 10 needs to determine how and where the uncertainties should be identified and documented.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
IDHW/DEQ Comments, March 1997 (continued)		DEQ asked if WAG ERAs have been reviewed to identify species and/or conditions that cannot be dealt with on a WAG basis (e.g., migratory species). WAG 10 responded by stating migratory species and other species have been assessed at the WAG level. These species will also be assessed at the INEEL-wide ERA level.	The comparison of literature values used to model contaminant movement need to be compared against sampling results. Impacts of any changes or adjustments of the sampling parameters then need to be determined. The OU 10-04 ERA needs to present the results of the assessment of the migratory species and other species.
Draft Scope of Work for OU 10-04 Comprehensive RI/FS: IDHW/DEQ, November 1996	Page E-2, Comment 7	DEQ stated that in the Draft SOW, it appeared that WAGs are leaving some sites with ecological risk unremediated because they were screened on the basis of human health. They also stated that it was unclear as to whether WAG 10 will address the risk at these sites specifically, or whether WAG 10 will only look at the cumulative effects on a receptor which encounters these contaminated areas while visiting multiple WAGs. WAG 10 responded by clarifying the SOW and stated "Generally, sites screened for human health that remain a potential problem for ecological receptors are a problem due to native metal concentrations. Metals appear problematic at background levels due to ecological risk methodology. It is anticipated that results of the INEEL-wide sampling will allow more informed discussions of these matters, and that all sites then retained at the WAG level will be again revisited with this new knowledge.	Once results of FY-97 field season are obtained, metal concentrations of retained sites need to be evaluated. Responsibility for revisiting previous decisions and assumptions against sampling results.
	Page E-7, Comment 16	DEQ stated that it is not clear whether WAG 10 will support sampling at individual WAGs to address sites which have not been screened at the WAG SLERA or ERA level. The SOW also states, "The results of the SLERAs and WAG ERAs will be summarized and used to direct any sampling that may be required to support the OU 10-04 effort, as well as to evaluate overall risk to INEEL ecological receptors." WAG 10 responded by revising the SOW to provide more clarification.	This comment needs to be considered when developing any proposed ecological sampling methodology for FY-98.
IDHW/DEQ, November 1996 (continued)	Page E-15, Comment 35	DEQ noted that text in the SOW should be corrected to read "WAG 7 has deferred the decision about needing an ERA until the remedy(s) are selected in the ROD."	There appears to be a discrepancy when to decide whether an ERA is needed for WAG 7 will be made. This issue needs to be resolved.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
Memo from Steve Golian to Patti Kroupa, et al. on Draft Summary Notes from the Peer Review held 4/9-10/97. Memo dated 4/21/97	Page 2 Ecological Risk Focus Area	Peer review comments stated that it was important to first verify the presence of metals within the WAG-3 plume prior to initiating the biotic sampling. Otherwise, there is a risk of collecting data of little to no use for subsequent management decisions. It was also recommended to solicit public input on the proposed assessment strategy. If the agencies agree that additional information is required, then their needs should be integrated into sampling/analytical activities as directed by the Assistant Secretary's Natural Resource Damage Assessment (NRDA) policy.	Once sampling information is obtained, it needs to be evaluated with respect to metals existing within the WAG 3 plume and whether the results met the public needs/issues. NRDA needs/issues cannot be addressed at this time.
Memo from Patti Kroupa to Susan Barna dated April 28, 1997: RE-Missing pages from Peer review	Page 3 of fax	A potential problem area was identified as WAG 3. Specifically radionuclide and metal concentrations in biota in WAG 3 Idaho Chemical Processing Plant (ICPP) plume are not a level that could impact ecological receptors. However, it was stated that no remedial action is likely as deposition of metals would occur as long as ICPP remains operational (i.e., 50 years). Currently there is no evidence that metals are posing an ecological risk, and remedial actions (e.g., soil removal) could potentially have a greater environmental impact.	For metals, there is a need to determine, based on sampling results, whether the metals are present above background. If present, then conduct biota sampling to verify uptake model and determine whether levels within the plume pose an ecological risk.
		A potential problem area identified for the INEEL-wide ERA was whether off-site sampling is necessary to support remedial decision-making. The recommended approach was to sample in the reference area off-site to collect a suite of COPCs in biota. This data then would be compared to the on-site contamination to confirm the differences.	The peer team determined whether off-site sampling was not necessary to support remedial decision-making. Rather, on-site sampling should be used to determine spatial extent of contamination and verify the uptake model.
Transmittal Letter for the Draft Sampling and Analysis Plan from Kathleen Falconer to Nolan Jensen, May 19, 1997 (RE: Attachment Gerry Winter Memo to Patti Kroupa dated April 29, 1997)	Attached Memo, Page 2 *Uncertainty* Subheading	It was stated that if the WAG managers determine that the level of uncertainty is unacceptable after reviewing the data collected from this effort, a follow-up sampling effort would be considered.	This comment needs to be considered after a review of the sampling data is collected. This comment supports consideration of additional sampling if results warrant this.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
Memorandum from Steve Golian, EM-47 to Patti Kroupa; June 4, 1997	Attachment	Department of Energy Headquarters (DOE-HQ) states that the Ecological FSP will be provided to the NRDA trustees and tribal contacts for review and comment. A fact sheet will be distributed to the public the summer of 1997. The Site-Specific Advisory Board will be briefed on the scope and schedule of the OU 10-04 RI/FS.	The point at which each of these actions occurred needs to be documented in the appropriate sections of the Work Plan if possible.
Draft Field Sampling Plan, comments from USFWS, June 19, 1997	1	USFWS strongly recommends that the FSP expand the aquatic sampling effort beyond the collection of one sample each of surface water and sediment from the Argonne National Laboratory-West (ANL-W) pond. USFWS states the "proposed sampling effort is inadequate to address the potential for effects to migratory birds from the proposed pond, as well as all other aquatic sources at the Idaho National Engineering and Environmental Laboratory (INEEL)." This will help give estimates of the total number of birds potentially exposed. With additional funds, analyses could be expanded to include metals as well as radionuclides. These data provide actual measurements of contamination in the species groups of interest from the locations of interest and may be used to supplement and help interpret data collected in the WAG 10 Ecological Risk Assessment.	Prior to the initiation of the OU 10-04 RI/BRA, results of the ESRF study on estimating radionuclide transport via game birds from waste ponds in four INEEL (Test Area North-Technical Support Facility, ICPP, Test Reactor Area (TRA), and ANL-W) need to be evaluated. In addition, the foundation surveys of waterfowl at all waste ponds on the INEEL need to be reviewed. As stated in the response, this information will help give estimates of the total number of birds potentially exposed.
	2	U.S. Fish and Wildlife Service (USFWS) comments that it is unclear if the selected aquatic sampling location is the "worst case" scenario for both or one of the classes of contaminants, radionuclides, and/or metals. Additionally, it is unclear if ANL-W pond is selected due to the documented highest level of species richness or the availability of water for a longer duration than other resources. INEEL responds by stating that "they agree that this designation should have more support than that provided in the Draft Field Sampling Plan. Cieminski (1993) documented greater species richness at the industrial waste pond (IWP) than at any other pond in her study. Cieminski also indicated the IWP was among the top ponds in bird use and had the second greatest number of waterfowl broods reared there during her study. Cieminski discusses pond characteristics, which lead to greater wildlife use. This list of characteristics could also be used to support a "worst case" designation for the IWP."	In the development of the ecological FSP (Subsection 2.2, DOE-ID 1997a) presented in the OU 10-04 Work Plan (if determined necessary), this comment must be considered in selecting a site for aquatic sampling.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
Draft Field Sampling Plan, comments from USFWS, June 19, 1997 (continued)		INEEL goes on to state that "based on currently available data for radionuclide contamination, which demonstrate much higher radionuclide concentrations in components of other ponds on site" they'd recommend not stating that ANL-W is the worst case example.	
	3	The Service suggests that if an "optimum" opportunity is not available (due to verifying water levels) then alternatives should be discussed. INEEL responded by stating alternatives would be discussed. "Even if the proposed pond is entirely dry, sediment samples could be taken or alternative ponds could be selected based on Cieminski's work."	In the development of the ecological FSP presented in this *Work Plan* (if determined necessary) this comment must be considered in selecting a site for aquatic sampling.
	4	USFWS comments that "all aquatic sites should be considered a source for the movement of contaminants through, but not limited to, the ingestion of sediment, water, and aquatic invertebrates." The Foundation is currently sampling and determining population characteristics of Barn Swallows (TRA only) and Mourning Doves that use the INEEL ponds. In addition, they have conducted annual breeding bird surveys for several years around each of the facilities and in remote areas.	The results of the Foundation studies need to be evaluated prior to initiation of the *OU 10-04 RI/BRA*.
	5	The Service suggests that the FSP include discussion of species, which are listed under the ESA and are known to exist at the INEEL. The Service also commented that they would be interested in discussions of whether the aquatic and terrestrial foodweb models will provide an additional level of protection for listed species. The INEEL responded by stating that "the aquatic portion of the foodweb will be included in the OU 10-04 Work Plan, (and) updated versions of the list will be incorporated into the OU 10-04 Work Plan. INEEL also stated that it is not anticipated that field activities would impact the T/E species.	The OU 10-04 Work Plan needs to include the foodweb model, and if unavailable, then justification needs to be provided as to why it is not included. Also, the most up-to-date T/E species list was included in the Work Plan.
	6	The Service commented that there is no discussion related to native onion species used by wildlife as a forage species provided. They suggested this plant *not* be included as an alternative for additional sampling for the wildlife foodweb model, but might be better suited for inclusion in the human health model.	Onion sampling results need to be available to be incorporated into the human health methodology. This will be performed under the existing FSP in 1999.

Table C2-6-1. (continued).

Comment Reference	Comment Number	Comment/Response	Proposed Action
Draft Field Sampling Plan, comments from USFWS, June 19, 1997 (continued)		The INEEL responded by stating they are "currently sampling vegetation in support of the foodweb model as discussed in the FSP. Onion sampling was proposed by DOE to support the OU 10-04 human health risk assessment and to meet a request by the NRDA trustees (i.e., Sho-Ban tribes). Onion sampling was included in the Ecological FSP because vegetation sampling was being performed in applicable areas under the same standard operating procedures."	

Table C2-6-2. Summaries of agency comments directed at WAG ERA activities, responses, and actions.

Comment Reference	Comment Number	Comment/Response	Action
WAG 1			
WAG 1 RI/FS Work Plan, EPA Comments	Pg. 3, Comment 4	EPA states that the SLERA should include a discussion of contaminants and sampling locations relative to habitat. Accurate assessment of whether receptors are being affected requires characterization of the overlap of habitat and contaminated sites. WAG 1 responded was that site characteristics are such that the type of assessment suggested is more appropriately performed at the INEEL-site wide (OU 10-04) ERA level.	Determine if this is necessary at the OU 10-04 level and if so include as a data gap to work towards completion.
	Pg. 20, Comment 34	EPA comments that " since the toxicity reference value (TRV) is based on a daily dose, the exposure duration (ED) based on annual use of the site is inappropriate for use in the exposure equation. In this equation, *the result of assigning an ED of 0.5 to a migratory receptor is that the* daily dose is halved. Either the ED should be based on daily exposure and assigned a value of 1 in all cases, or the parameter should be removed. The WAG 1 response is that they will look into the concern, but in the meantime the most conservative EBSLs were developed for the functional group containing the smallest year-round resident and no contaminant was eliminated from future assessment unless this group was also eliminated.	Determine if this concern was addressed sufficiently in the WAG 1 ERA or if the OU 10-04 is going to follow-through with *addressing this concern further.*
WAG 1 RI/BRA EPA Comments	Pg. 19, Comment 32	EPA comments that "functional grouping is certainly acceptable, except when species-specific data are available. Use of species-specific values *will effectively limit the uncertainty associated with the* "grouping" of receptors. The WAG 1 response was that "this approach has been previously agreed upon by both IDHW and EPA Region 10 for assessments at the WAG level and will be maintained for consistency.	Can the functional grouping be used for the OU 10-04 ERA or would this be an expected comment for *OU 10-04 as well.*

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
	Pg. 21 Comment 49	EPA comments that the "lack of information should have triggered some field sampling and analysis of surrogate avian receptors. This would not only provide site-specific data on area receptors, it would increase data certainty. Dropping these constituents as compounds of concern because of the scant literature can only lead to underestimation of risk. Moreover, this potential under-estimation was not mentioned in the risk characterization portion of the ERA. The WAG 1 response was that the site specific investigation is beyond the scope of an ERA.	This appears to be a data gap for WAG 1 that needs to be included in the OU 10-04 investigation.
	Pg. 23, Comment 62	EPA comments that "the method by which TRVs were calculated does not appear to be sensitive to the dietary differences between herbivores, insectivores, carnivores, and omnivores (as reflected in the same TRV given to each of the 'receptor classifications' " The WAG 1 response was that this would be addressed at a later date.	This appears to be a data gap for WAG 1 that needs to be included in the OU 10-04 investigation.
WAG 1 RI/BRA IDHW Comment	Pg. 14, Comment 47	EPA comments that biotic transport of subsurface contamination by mammals and harvester ants should be appropriate at the WAG 1 level. The WAG 1 response stated that it is not appropriate for human health and therefore not appropriate for the WAG or INEEL-wide level ERA.	If it is determined that this is appropriate at the OU 10-04 level then this comment needs to be revisited.
WAG 2			
Scoping *Conference Call* Meeting Minutes 6/11/96	Item #5	The meeting minutes stated that LMITCO "presented a summary of the *OU 10-04 scoping discussions. WAG 10 will perform* population studies for the C2 and T/E species, and will do some studies at each WAG to check if a particular species does, in fact, live there. Bioaccumulation studies will also be performed. The appropriate section of the RI/BRA (for WAG 2) will be revised to better define the interface with the WAG 10 ecological studies."	This comment needs to be considered when conducting the population studies and bioaccumulation studies for OU 10-04.
RI/BRA IDHW Comments	Pg. 28, Comment 40	IDHW commented that a WAG should not state that a site of concern cannot be eliminated from consideration for remediation based on modeling, because it is possible that the OU 10-04 investigation could indicate a need for remediation at some of these sites.	This comment needs to be considered during the OU 10-04 ERA.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
	Pg. 28, Comment 41	IDHW comments that the RI/BRA should "leave open the possibility that the OU 10-04 investigation will show a need for remediation on the basis of ecological risk. It is stated that remediation based on human health risk is expected to reduce ecological risks, but an attempt should be made to quantify this reduction. Any proposed action or clean-up level should be evaluated to determine the degree to which it would reduce ecological, as well as human health risk. It is possible that slight modifications of human health-based remedial approach may be sufficient to address ecological risk, as well. WAG 2 responded to this comment by adding a discussion into the RI/BRA borrowed from the INEL-wide ERA Tech Memo (1996 LMITCO). However, they stated, that "this may not fulfill the full intent of the comment. Eco risk assessment will be considered in making a remediation decision as appropriate." WAG 2 also stated that they need to acknowledge that many decisions at the population level are more appropriately made through OU 10-04 at the INEEL-wide level.	Results from the population data derived in the OU 10-04 ERA must be compared to WAG 2 results to assist, change, or confirm remediation decisions.
RI/BRA EPA Comments	Pg. 1, Comment #1	EPA comments that Subsection C2-7.3 of the RI does not incorporate ecological risk into the risk management considerations, and that Risk Evaluation Section, Summary Section, and the Transition to INEEL-wide ERA do not provide sufficient summary data to facilitate integrating ecological risk into remedial decisions. In response, the document was revised to add more detail. Additionally, WAG 2 stated that they need to acknowledge that many decisions at the population level are more appropriately made through OU 10-04 at the INEEL-wide level.	Results from the population data derived in the OU 10-04 ERA must be compared to WAG 2 results to assist, change, or confirm remediation decisions.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
	Pg. 26, Comment 38	EPA stated that the risk management considerations based on ecological risk should be included in Subsection C2-7.3 where possible. In particular, EPA states that it would be useful to evaluate the degree to which human health and ecological areas of concern overlap. They also stated that in this section it sounds as if sites with risks below 1E-4 are being screened out, and that they should be carried through the analysis. WAG 2 responded by stating "that this section...acknowledges...that the ERA at TRA will continue in the OU 10-04 RI/FS from an INEEL population perspective. As a result of the ongoing nature of the ERA, it is premature to finalize the conclusions at this time, since the OU 10-04 decision could still effect WAG 2. WAG 2 then responds in its resolution that sites with calculated risks less than 1E-04 were not screened.	Population data resulting from the OU 10-04 ERA should be compared to WAG 2 results to assist in finalizing any ecological remedial action decisions.
RI/FS EPA Comments	Pg. 21, Comment #51 and 53	EPA commented that their concern that the ERA was not adequately incorporated in the risk evaluation and the risk management consideration presented in Sections 6 and 11 of the RI/FS. WAG 2 responded by stating "during a conference call (10/23/96) it was recognized by EPA that the INEEL-wide ERA questions are being answered in a time frame that does not support the FS evaluations. They still feel that ecological considerations can be addressed in the FS evaluations. To resolve this issue, LMITCO will select a site of concern, as a test case, and incorporate ecological considerations into the evaluation of FS alternatives. This test case site of concern will be submitted to the agencies for review and remaining sites will be changed as agreed upon."	A test case was completed and ecological considerations were included in the FS, however it should be noted that the potential exists that the alternatives proposed to protect ecological concerns may need to be reconsidered if the OU 10-04 ERA changes assumptions and uncertainties used to feed the FS. This was stated in a cover letter to the agencies in the submittal of the ROD (need cover letter reference here)

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
Meeting Minutes 1/08/97	Comment #80	IDHW noted that remedial activities may be required at sites where ecological risk evaluations are deferred to the OU 10-04 RI/ERA, requiring post-ROD or post-remedial action responses. Robin Van Horn noted that all sites with ecological risks are also sites with human health risks, for which remediation or institutional controls are planned. The only exceptions are the Paint Shop Ditch, TRA-16 and the ATR cooling tower. All of these are co-located sites, inside the fence and managed administratively. These sites are poor habitat for ecological receptors and actual risks to ecological receptors will likely be low. The resolution stated in the meeting minutes is that "the three co-located sites will be added to the Final OU 2-13 RI/FS report."	After the ERA for OU 10-04 is complete results need to be compared with the decisions made for WAG 2. A potential for a ROD amendment exists if the results change the remedial action decisions made for ecological concerns.
WAG 3			
RI/FS Work Plan, Linda Meyer, EPA Region 10, March 1995	Pg. 2 General	The boundary of CPP-88, stating it should consist of surface radioactive contaminants in all areas not included in ECAs. WAG 3 responded that CPP-88 is defined as the "radioactively contaminated soil within ICPP that occur outside environmentally controlled areas (ECAs)". The release areas outside the ICPP are planned to be addressed as part of the OU 10-06 "Radionuclide-Contaminated Soils RI/FS for the Idaho Chemical Processing Plant."	WAG 10 needs to confirm the resolution is appropriate.
	Pg. 32 and 33, Comment 94)	EPA disagreed with a statement in the Work Plan stating that "the area of the ICPP represents a small area within a relatively large and undisturbed habitat...The lack of substantial vegetation and water for wildlife are likely to limit exposure of ecological receptors." A correction to the Work Plan was made in response to this comment recognizing man-made wetlands likely increase exposure to some receptors to contaminants present in percolation and evaporation ponds.	Make sure the response to this comment does not conflict with language in Proposed Plan or RI/FS that ignores risks to ecological concerns from percolation ponds. Determine what is proposed action for perc. Ponds and if it protective of human health as well as environment.
	Pg. 34, Comment 100)	Two species were missing from a species of concern list. Those species mentioned have been incorporated into the final work plan, however, since the WAG 3 SLERA and WAG ERA were completed, a new list from the Fish and Game of species of concern has been compiled.	Compare WAG ERA list of species of concern with the latest list and determine the impacts of any changes.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
RI/FS, EPA Comments, 6/30/97	Pg. 4, Comment 10)	EPA commented that the objectives of an ERA were not sufficiently met. WAG 3 responded that "A more detailed Risk Evaluation and Discussion of Uncertainty will be provided in the revised WAG 3 ERA. The more detailed discussion of actual or potential risks will be included as part of the OU 10-04 RI/BRA.	Determine if WAG 10 agrees that "The more detailed discussion of actual or potential (WAG 3) risks will be included as part of the OU 10-04 RI/BRA".
	Pg. 5, Comment 14	EPA stated that the RI/FS states that "remediation decisions based on ecological risk are being deferred so that they may be decided on an INEL-wide level."	WAG 3 is addressing remedial action decisions for sites at WAG 3 posing an ecological concern.
	Pg. 26, Comment 98)	The EPA states that "information should be used to evaluate the effects of contaminants on invertebrates and ecosystems at the INEL". WAG 3 responded that data gaps will be addressed and the site, contaminants, and receptor combinations indicative of potential risk will be further evaluated as part of the OU 10-04 (INEEL-wide) ERA. Also bioaccumulation of contaminants by invertebrates (and subsequent food chain impacts) will be evaluated at the INEEL-wide ERA level.	Determine if the response is appropriate for WAG 10. If so, the following issues must be included as data gaps: further evaluate site, contaminants, and receptor combinations indicative of potential risk and address bioaccumulation of contaminants by invertebrates.
	Pg. 27, Comment 102	The EPA states that the source of EBSLs should be provided and discussed in both the text and the table. WAG 3 responded states that EBSLs have been finalized for site-wide use and will be included in the OU 10-04 work plan.	Until the EBSLs have been finalized for site-wide use and included in the OU 10-04 Work Plan, please refer to the guidance manual for conducting ERAs. Final EBSLs will be included in the Work Plan.
	Pg. 28, Comment 107	EPA states the discussion of behavior and fate of contaminants in the environment does not adequately cite the sources of information. In response WAG 3 revised the fate and transport descriptions for each COPC and combined the ecotoxicological profiles for the contaminants.	OU 10-04 needs to review results of the revision in developing fate and transport discussion for the OU 10-04 ERA.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
	Pg. 28, Comment 108	EPA stated that the actual methods used to determine potential exposure to ecological functional groups is not presented, and omission of information prevents a comprehensive review. EPA goes on to state that "The (RI/FS) document should summarize the exposure information used in the ERA and cite the sources from which the information was obtained. Information such as indicator species evaluated, species habitat, home range, and feeding preferences should be presented. WAG 3 responded that the exposure information requested and citations will be tabulated and presented in detail in the OU 10-04 Work Plan.	Determine at what stage of development is the tabulation and incorporate into OU 10-04 Work Plan where appropriate.
	Pg. 29, *Comment 111*	EPA commented that the RI/FS states "effluent concentrations from the *site are compared to water quality criteria ...derived for the protection* of human health, and, as such, are not necessarily protective of ecological receptors. Further the specific source of the screening criteria should be cited in text and in Table 27-23." The approach has since been revised to screen surface water concentrations from waste water and effluent ponds against toxicological benchmarks for wildlife exposure via drinking water. Comparisons to MCLs were used only in the absence of toxicological benchmarks for certain contaminants. This assumes that drinking water criteria that were conservatively designed to be protective of human receptors will protect ecological receptors as well.	Missing TRVs will be treated as uncertainties *for the OU 10-04 ERA. Determine impacts* of this methodology to WAG 3.
	Pg. 30, Comment 116	EPA comments that "hazard quotients for ecological receptors or functional groups should be presented...instead of a site-by-site basis. An additional summary table should be included in this document...that presents risk to ecological receptors, and discusses the results of the assessment." WAG 3 responded that the information will be compiled and presented in the OU 10-04 RI/BRA.	The need to compile HQs for functional groups and the need to present risks to ecological receptors and discuss results of this assessment should be included as a data gap for the OU 10-04 RI/FS.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
RI/FS Comments, IDHW 6/30/97	Pg. 8, Comment 11	IDHW comments that "The sentence implies that ecological risk management decisions will be deferred to the OU 10-04 ROD. Since ecological risk management decisions may be made for WAG 3 under the WAG 3 ROD, it is suggested that this sentence be deleted." WAG 3 responded to this comment, which was also an EPA comment, by rewording this sentence.	None required.
	Pg. 44, Comment 128	The state commented that "The sentence states, 'Even through a SLERA was prepared earlier, revised to meet agency comments, and included as Subsection C2-7.5, decisions based on the ERA are being deferred until more ecological risk information is developed during the OU 10-04 INEL-wide ERA.' The decision on whether to address ecological risks at the time of the WAG 3 ROD, or to defer them until the OU 10-04 ROD will be made during the risk management phase of the WAG 3 RI/FS. Although it appears that much of the remedial action decision-making for ecological risk at WAG 3 will indeed occur in conjunction with the OU 10-04 ROD, IDHW/DEQ wishes to reserve the opportunity to make ecological risk remedial action decisions, if warranted, for WAG 3 in conjunction with the WAG 3 ROD." WAG 3 responded, "Noted. It is important to remember that the WAG ERA results were not designed to support decisions for remedial actions based on risk to ecological receptors, however, to some extent they can provide useful information in support of human health remedial decisions."	This is being addressed by WAG 3. WAG 3 ERA results and actions will be used as inputs to the OU 10-04 ERA.
EPA Comment on WAG 3 RI/FS Aug. 13, 1997	Letter from Howard Orlean to Nolan Jensen, dated Aug. 13, 1997	EPA states that "the results for the ERA were not incorporated into the FS ...and these issues need to be resolved before plans for remediation move forward. Comment to Resolution to Comment 111)	This comment needs to be considered in the methodology.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
		EPA does not necessarily agree with the resolution to 111) (above). They recommend the following: "A literature search for no observed adverse effect level (NOAEL)-based or lowest observed adverse effect level (LOAEL)-based benchmark should be performed, in addition to the Opresko (Opresko, et al 1995). Benchmarks from surrogate chemicals could be used as well. Use of MCLs for evaluating risk to ecological receptors from drinking water should be the last alternative in this evaluation.	
WAG 4			
WAG 4 RI/FS Work Plan, EPA, March 19, 1997	Pg. 3, Comment 10	EPA commented that it is unclear as to the purpose or intent of including WAG 4 screening documentation as an attachment. WAG 4 responded the attachment would be removed but key elements of the attachment would be incorporated into the Work Plan narrative. WAG 4 also included in their response that "it was determined that the SLERA is not a necessary element in the work plan."	This comment needs to be considered in the Work Plan for OU 10-04 in particular in the screening discussion for WAGs 6 and 10.
	Pg. 11 Comment 11	EPA commented that "it is not clear whether air pathways will be quantitatively assessed, and Table 10 only states that potential receptors for the inhalation exposure routes are 'to be identified'. WAG 4 responded that "the discussion on air pathways in this section was reviewed and the statement in this section indicates that this pathway will be qualitatively assessed if deemed necessary based on the COPC."	During development of the air pathway discussion for the OU 10-04 Work Plan and RI/FS this comment needs to be considered.
EPA Comments, 1/08/97	Pg. 1, Comment 3 and 44	EPA stated that the ecological data gap analysis (EDGA) is detailed and difficult to follow and draws no conclusions as to what data has been collected and analyzed. They further state that "it is unclear ...how the SLERA, the EDGA, ...WAG ERA, and the WAG 10 ERA are differentiated."	The resolution to this comment needs to be reviewed by the OU 10-04 ecological project team to determine if the response is still accurate based on changes in sampling direction. If the response has changed, then WAG 4 needs to be informed to ensure changes are reflected in OU 10-04 RI/BRA.

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
		WAG 4 responded as follows: "At the time the first SLERAs were performed it was believed that biotic sampling would occur at each individual WAG and that this information would be combined and used in the WAG ERA. It was then anticipated that the results of the WAG ERA would be summarized in the INEL-wide ERA and that at the INEL-wide level, only additional migratory species and/or species that had possible multiple WAG exposures would be modeled. "Based on discussions with the agencies it has been decided that actual biotic sampling (to verify modeling assumptions) will be deferred to the INEL-wide ERA. This is based on both cost, and scheduling issues and has resulted in a much more comprehensive approach to ecological concerns at the INEL. However, this resulted in a change to the approach. Subsequently, now each WAG is performing the initial site screening at the time of the Work Plan to assess data gaps at the WAG level. Data gap evaluation at the WAG level includes a more comprehensive assessment of the detection levels used based on ecological receptors as well as the sampling that has occurred. A data gap at the WAG level may also include development of toxicity reference values, PUFs, and BAFs for any contaminant for which this information has not been compiled previously at another WAG. The WAG ERA at this time uses the INEL-wide EBSLs to screen contaminants and then assesses exposure to ecological receptors using models for those contaminants that were not screened. The results of the WAG ERA are used to identify INEL-wide COPCs and to aid in the selection of sampling areas both biotic and biometric sampling. INEL-wide ERA will compile and evaluate the WAG ERAs on a larger scale incorporating the results and interpretation of field sampling results. WAG 4 was in the work plan stage at the time of this transition and has developed both a simplified SLERA and a data gap analysis."	

Table C2-6-2. (continued).

Comment Reference	Comment Number	Comment/Response	Action
	Pg. 9, Comment 43	With respect to windblown contamination, EPA suggests that modifying the EBSLs based on the site use factor may not be appropriate even though that receptor spends less time in WAG 4 than in surrounding areas. Risk calculations based on high EBSLs may therefore be underestimated. In addition, if the range of probable receptors is large enough to include other more contaminated WAG assessment areas, than the cumulative risk to those receptors could be underestimated. WAG 4 responded by stating "the EBSLs are now calculated using a default SUF of 1.0 and should therefore be conservative. In the SLERA approach, an assessment area that included significant areas around the WAG itself was used. This would result in a large assessment area that should be conservative given the above concerns. However, it is assumed that the human health assessment, as well as monitoring data collected by the Radiological Environmental Sciences Laboratory (RESL), would have identified any extensive windblown contamination at WAG 4, making this a human health and ecological concern.	The response to the comment on EBSL calculation needs to be considered in the EBSL modification and discussion to be included in the OU 10-04 investigation. If the response should be changed, WAG 4 needs to be informed in order to capture the changes in their RI/BRA.
WAG 5			
RI/FS Work Plan, IDHW, 3/25/97	Comment 9	IDHW questioned if EPA Region III risk-based concentrations or EPA soil screening levels were used for comparison purposes. The text clarified that the EPA Region III risk based numbers are used because the soil screening levels do not addresses radionuclides.	This comment needs to be considered in the OU 10-04 Work Plan in particular in the screening discussion for WAGs 6 and 10.
WAG 7			
Draft Final Work Plan for OU 7-13 4/17/96 EPA	Comment #18	EPA commented that "there is a need for the biotic pathway model to be able to handle (analyze) containment failure as part of the required model criteria. In addition, the consideration of time dependent waste emplacement under this biotic model should also be included among the identified criteria.	Prior to development of the OU 10-04 modeling approach, this comment needs to be considered by the ecological project team.

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Attachment C2-1

WAG-Specific Data Gap Summary

Appendix C2
Attachment 1

WAG Ecological Risk Assessment Results

CONTENTS

TABLES

Appendix C2
Attachment 1

WAG Ecological Risk Assessment Results

C2-1-1. WAG 1 ECOLOGICAL RISK ASSESSMENT

An initial site screening that eliminated sites from evaluation in both the data gap analysis and for future Ecological Risk Assessments (ERAs) was completed for Waste Area Group (WAG) 1 *Federal Facility Agreement and Consent Order* (FFA/CO) (DOE-ID 1991) sites. This screening was followed by a data gap analysis that evaluated existing human health contaminant sampling data to identify sites and contaminants for which characterization is inadequate for performing the WAG 1 ERA. The methods applied and results of this two-step analysis are discussed in this section.

C2-1-1.1 Summary of WAG 1 Site Screening

The first phase in the INEEL ERA process is the screening level ERA (SLERA)—a "preassessment" or data gap analysis performed at the WAG level. The SLERA phase reduces the number of sites and contaminants to be addressed in subsequent assessments. WAG 1 used this screening as a preassessment tool to (a) better define the extent and nature of individual WAG sites of contamination, (b) identify sites at which no contaminants of potential concern (COPCs) are found, (c) reduce the number of COPCs to be addressed in the WAG ERA by eliminating those that clearly pose a low likelihood for risk, (d) identify sites for which further data are needed, and (e) identify other data gaps. The screening also serves to support problem formulation and determine media and pathways to be evaluated for WAG ERA.

The second phase in the INEEL ERA process is the WAG ERA, which provides a site-by-site evaluation of the risks to ecological resources as a result of exposure to radiological and nonradiological contaminants at the WAG level. The WAG 1 SLERA was conducted to screen sites identified in the FFA/CO (DOE-ID 1991) and to identify those contaminants present at WAG 1 that have the potential to cause undesirable ecological effects. The sites and contaminants identified as a result of the SLERA, in addition to those sites for which inadequate sampling information existed for inclusion in the SLERA are analyzed in the WAG ERA. This assessment was performed using the same basic methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995).

C2-1-1.2 WAG 1 Ecological Risk Assessment

Table C2-1-1-1 provides a list of sites included in the WAG ERA and contaminants of potential concern (COPCs) shown for each site. The initial screening eliminated five organic contaminants, three metals, and all radionuclides. This resulted in twelve sites being eliminated from the assessment (Technical Support Facility [TSF]-06, TSF-09/18, TSF-26, TSF-29, TSF-36, and TSF-37). Another site, Loss-of-Fluid Test (LOFT)-12, was assessed subsequently in the WAG 1 ERA. Of the remaining sites, two were totally eliminated from further assessment (TSF-06, Area 7 and TSF-22 [see Table C2-1-1-1]). In summary, the seven sites that have contamination causing hazard quotients (HQs) greater than 1.0 include LOFT-02, TSF-03, TSF-07, TSF-08, Water Reactor Research Test Facility (WRRTF)-01, WRRTF-03 and WRRTF-13.

Table C2-1-1-1. WAG 1 ERA results.

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 1-03	Yes	*COPCs*: Pb and 2-methylnaphthalene
Site: TSF-03		*Contaminated Media*: Subsurface soil
TSF Burn Pits		*HQs:* Pb >1 and <1000, 2-methylnaphthalene >1 and <10
		Comment: HQs for exposure to Pb and 2-methylnapthalene in soil exceeded the target value of 1.0. No avian, reptilian, amphibian, or plant toxicity data available for 2-methylnaphthalene and TRVs for these species could not be derived. No reptilian or amphibian toxicity data available for Pb and TRVs for these species could not be derived. WAG 1 must address TSF-03 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.
OU 1-03	Yes	*COPCs*: Metals and 2-methylnaphthalene
Site: WRRTF-01		*Contaminated Media*: Subsurface soil
WRRTF Burn Pits		*HQs:* Cr^{+3} >1 to <300, Cr^{+6} >1 to <300, Pb >1 to >4,000 (4,004.51); and 2-methylnaphthalene >1 to <300
		Comment: HQs that exceeded 1.0 include Cr^{+3}, Cr^{+6}, Pb, and 2-methylnaphthalene. HQs could not be determined for reptilians or amphibians due to the lack of appropriate toxicity data to derive TRVs for chromium III. Additionally, risk resulting from exposure to chromium VI could not be evaluated for avian reptilian, or amphibians receptors for the same reasons. 2-hexanone does not have a listed HQ in the WAG ERA, but concentration is >EBSL. WAG 1 must address WRRTF-01 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.
OU 1-04	Yes	*COPCs: Metals and other inorganic compounds*
Site: LOFT-02		*Contaminated Media*: Surface-sediment, subsurface soil and water
LOFT Disposal Pond (TAN-750)		*HQs:* Cu >1 to <20; fluoride >1 and <30; Mn >1 and <30
		Comment: No reptile or amphibian toxicity data available for Mn and TRVs for these species could not be derived. Reptile, amphibian, or plant toxicity data available for fluoride and TRVs for these species could not be derived. It is also expected that the pond would be used by bat species, although their presence has not been documented. It was stated Ag was slightly about EBSL, although the concentration does not appear in the EBSL table. Sulfate does not have a listed HQ in the WAG ERA, but concentration is >EBSL. WAG 1 must address LOFT-02 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.

Table C2-1-1-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 1-04	No	*COPCs:* Radionuclides and metals
Site: TSF-29		*Contaminated Media:* Surface and subsurface soil
TSF Acid Pond (TAN-735)		*Potential Data Gap:* Potential contamination remains in soils.
		Comment: In the WAG ERA, radionuclides and metals were either <EBSL or background, and therefore eliminated.
OU 1-05	No	*COPCs:* Radionuclides and metals
Site: TSF-06		*HQs:* Contaminants < target values
TSF TAN/TSF-1 Soil Area		*Contaminated Media:* Surface and subsurface soil
		Potential Data Gap: Potential contamination remains in soils.
		Comment: In the WAG ERA, radionuclides and metals were either <EBSL or background, and therefore eliminated.
OU 1-05	No	*COPCs:* Radionuclides and metals
Site: TSF-09		*HQs*: Contaminants < target values
TSF Intermediate-Level (Radiation) Waste Disposal System		*Contaminated Media:* Subsurface soil
		Potential Data Gap: Potential contamination remains in soils.
		Comment: In the WAG ERA, radionuclides and metals were either <EBSL or background, and therefore eliminated.
OU 1-05	No	*COPCs:* Cs-137, Mn
Site: TSF-10		*Contaminated Media:* Surface-sediment, subsurface soil and water
TSF Drainage Pond (TAN-782)		*Potential Data Gap:* Potential contamination remains in soils.
		Comment: In the WAG ERA, Cs-137 and Mn were either <EBSL or background, and therefore eliminated.
OU 1-05	No	*COPCs:* Radionuclides
Site: TSF-18		*Contaminated Media:* Surface and subsurface soil
TSF Contaminated Tank Southeast of Tank V3		*Potential Data Gap:* Potential contamination remains in soils.
		Comment: In the WAG ERA, radionuclides were <EBSL, and therefore eliminated.

Table C2-1-1-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 1-05	No	*SLERA COPCs:* Radionuclides
Site: TSF-26		*WAG ERA COPCs:* Cs-137, Co-60
TSF PM-2A Tanks (TAN-710 A and B)		*Contaminated Media:* Surface and subsurface soil
		SLERA Data Gap: Potential contamination remains in soils.
		Comment: In the WAG ERA, radionuclides were <EBSL, and therefore eliminated.
OU 1-06	Yes	*COPCs*: Metals, cyanide, and organic compounds
Site: TSF-07		*Contaminated Media*: Surface-sediment, subsurface soil and water
TSF Disposal Pond		*HQs:* As >1 and <20, Al >1 to <2,000, Sb >1 to <30, Ba >1 to <90,000, Co >1 to <40, cyanide >1 to <20, Ni >1 to <30, Hg >1 to <200, Ni >1 to <300, Se >1 to <500, Sr >1 to <10, Tl >1 to <400, Sn >1 to <300, V >1 to <90, Zn >1 to <400; benzo(b)fluoranthene >1 to <10, tetrahydrofuran >1 to <20,000,
		Comment: It is also expected that bats would use the pond, although their presence has not been documented. HQs for As, Hg, or Tl could not be determined for reptiles or amphibians due to the lack of appropriate toxicity data to derive TRVs. No reptile, amphibian, or plant toxicity data were available for tetrahydrofuran so HQs and TRVs could not be derived. No EBSL was available for Ag. PCBs, all organic compounds except benzo(b)fluoranthene and tetrahydrofuran, Cr^{+3}, Fe, potassium, Na, and sulfate have concentrations >EBSLs though no HQs are listed in the WAG ERA. In the WAG ERA, radionuclides were <EBSL, and therefore eliminated. WAG 1 must address TSF-07 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQs >1.
OU 1-06	Yes	*COPCs*: Hg and radionuclides
Site: TSF-08		*Contaminated Media*: Subsurface soil
TSF HTRE III Hg Spill Area		*HQs:* Hg >1 to <300, Cs-137 and Co-60 <1
		Comment: HQs could not be determined for reptiles or amphibians due to the lack of appropriate toxicity data to derive TRVs. In the WAG ERA, radionuclides were <EBSL, and therefore eliminated. WAG 1 must address TSF-08 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQs >1.

Table C2-1-1-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 1-08	Yes	*COPCs*: Organic compounds
Site: WRRTF-13		*Contaminated Media*: Subsurface soil
WRRTF Fuel Oil Leak		*HQs:* 2-methylnaphthalene >1 to <1,000, TPH >1 to <200, xylene >1 and <10, naphthalene, and phenanthrene >1
		Comment: HQs for amphibian, avian, reptilian, and plant receptors could not be determined because TRVs could not be derived for these receptors. WAG 1 must address WRRTF-13 in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQs >1.
OU 1-08	No	*COPCs*: Cs-137 and Hg
Site: TSF-22		*Contaminated Media:* Surface and subsurface soil
TSF Railroad Turntable		*HQs:* Neither Cs-137 nor Hg exceeded target value.
		Comment: All COPCs were either <EBSL or background, and therefore eliminated. No contaminants >EBSLs or HQs >1 remain in this site. In the WAG ERA, Cs-137 and Hg were either <EBSL or background, and therefore eliminated.
OU 1-09	No	*COPCs*: Radionuclides, metals, and VOCs
Site: TSF-36		*Contaminated Media:* Subsurface soil
TAN-603 French Drain		*Potential Data Gap:* Results from the soil sample analysis taken from the sump base detected benzo(a)pyrene during the 1994 removal action.
		Comment: In the WAG ERA, radionuclides, metals, and VOCs were either <EBSL or background and therefore eliminated.
OU 1-09	No	*COPCs:* Sr-90 and H-3
Site: TSF-37		*Contaminated Media:* Subsurface soil
TSF Contaminated Well Water Spill		*SLERA Data Gap:* Residual contamination remaining in subsurface soil.
		Comment: In the WAG ERA, Sr-90 and H-3 were either <EBSL or background and therefore eliminated.

Table C2-1-1-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 1-09	Yes	*COPCs*: Metals
Site: WRRTF-03		*Contaminated Media*: Surface and subsurface soil
WRRTF Evaporation Pond (TAN-762)		*HQs:* (Cd >1 to >4,000 (4,449.14), Cr^{+3} >1 to <100, Cr^{+6} >1 to <100, and Ag >1 to 20)
		Comment: There is no background value for Ag. Amphibians and reptilians could not be evaluated for exposure to Cd due to an absence of appropriate toxicity data. HQs for chromium III could not be evaluated for amphibians and reptiles. HQs for chromium VI were only determined for mammals and plants due to an absence of toxicity data for other species. Amphibian, reptilian, and avian receptors could not be evaluated for exposure to Ag due to an absence of appropriate toxicity data. WAG 1 must address WRRTF-03 in its clean-up decision (i.e., monitoring, clean up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.
OU 1-10	Yes	*COPCs*: PCBs
Site: LOFT-12		*Contaminated Media:* Surface and subsurface soil
LOFT XFMR Yard #2 PCB Spill		*HQs:* Aroclor-1260 < target value.
		Potential Data Gap: Concentration of Aroclor-1260 is >EBSL.
		Comment: WAG 1 must address LOFT-12 in its clean-up decision (i.e., monitoring, clean up).

All of the retained sites, with the exception of WRRTF-13, have HQs greater than 1.0 for exposure of receptors to metals in soil. Metals that appear to present the greatest potential for adverse effects include arsenic, cadmium, chromium (III and VI), fluoride, lead, manganese, mercury, silver, and thallium. The sites that have HQs greater than 1.0 from organic contamination include TSF-03 (2-methylnaphthalene), TSF-07 (tetrahydrofuran), WRRTF-01 (2-methylnaphthalene), and WRRTF-13 (2-methylnaphthalene and TPH).

Each of the seven sites had at least one occurrence of missing HQs for different species due to a lack of toxicity data for each COC to calculate the TRVs. The species missing the information varied from site to site, but included reptiles, amphibian, plant, and avian receptors. In some sites, HQs were only calculated for certain species while the others were not calculated due to an absence of appropriate toxicity data. Other data gaps concern the possibility of a species at a site without any confirmed documentation of their presence (see Table C2-1-1-1).

C2-1-1.3 Status of WAG 1 Ecological Investigations

As stated above WAG 1 has completed both a SLERA and a WAG ERA as of September 1997. The WAG ERA was presented in the *WAG 1 Comprehensive RI/FS* (Blackmore 1997). The agencies have commented on this RI/FS and comments on the ERA that require consideration prior to conducting the OU 10-04 ERA are included in Table C2-6-2 (refer to Appendix C2). A draft proposed plan has been developed that briefly addresses the results of the ecological risk assessment. The draft proposed plan indicates that the seven sites that have hazard quotients greater than 1.0 from contamination include the Mercury Spill Site (TSF-08), TAN Disposal Pond (TSF-07), LOFT Disposal Pond (LOFT-02), WRRTF Burn Pits (WRRTF-1), WRRTF Evaporation Pond (WRRTF-03) and Diesel Fuel Leak (WRRTF-13). TSF-08, TSF-03, TSF-07, WRRTF-01, and WRRTF-13 also pose a human health risk greater than allowable levels. Some level of risk reduction is expected at all sites with human health risks, either by implementing institutional controls such as maintaining existing soil covers or active remediation. The WAG 1 ERA will provide input into the OU 10-04 ERA that will evaluate whether contamination at all WAGs contributes to potential risk to populations and communities on an ecosystem wide basis. The need for remedial action at sites posing an unacceptable ecological risk will be determined based on the results of the INEEL-wide ERA."

C2-1-2. WAG 2 ERA

A SLERA and WAG ERA have been completed for WAG 2. The SLERA identified those contaminants present at WAG 2 that have the potential to cause undesirable ecological effects. The WAG ERA, the second phase in the INEEL ERA, provided WAG 2 a site-by-site evaluation of the risks to ecological resources as a result of exposure to radiological and non-radiological contaminants at the WAG 2. The sites and contaminants identified as a result of the SLERA, in addition to those sites for which inadequate sampling information existed for inclusion in the SLERA, were analyzed in the WAG ERA. Results of both assessments are summarized in Table C2-1-2-1.

C2-1-2.1 Summary of WAG 2 Site Screening

A SLERA for WAG 2 was performed using the methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995). The SLERA identified those contaminants present at WAG 2 that had the potential to cause undesirable effects. Those sites identified in the FFA/CO (DOE-ID 1991) were considered in the SLERA. Any site for which inadequate contaminant information was available to determine potential ecological effects was acknowledged.

The WAG ERA, the second phase of the INEEL ERA, was performed using the results of the WAG 1 SLERA and also followed the same basic methodology presented in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (Van Horn et al. 1995). In the WAG 2 RI/FS (Burns et al. 1997), it was stated that the objectives of the assessment was to define the extent of contamination with respect to ecological receptors for each site within the WAG; determine the actual or potential effects of contaminants on protected wildlife species, habitats, or special environments at the WAG level; identify sites and contaminants of potential concern (COPCs) to be assessed at the OU 10-04 ERA; and provide input to the data gap analysis for the OU 10-04 ERA.

C2-1-2.2 WAG 2 Ecological Risk Assessment

The initial screening in the WAG ERA eliminated 26 organic contaminants, five metals, and 10 radionuclides. The PCB sites (TRA-619, 626, and 653) exceeded the target value for only one functional group—AV210A, avian insectivores. HQs were greater than 0.1 for at least radionuclide contaminant at sites Test Reactor Facility (TRA)-03, TRA-19, and Brass Cap Area. Sites that have HQs greater than 1.0 due to metal contamination include TRA-02, TRA-03, TRA-04/05, TRA-06, TRA-08, TRA-13, TRA-15, TRA-16, TRA-36, and TRA-38. And, sites that have HQs greater than 1.0 due to organic contamination include TRA-02, TRA-04/05, and TRA-34.

A complete list of the sites of concern and the accompanying COPCS identified in both the WAG 2 SLERA and WAG ERA are listed (see Table C2-1-2-1).

C2-1-2.3 Status of WAG 2 Ecological Investigations

As stated, WAG 2 completed both a SLERA and a WAG ERA. The WAG ERA was presented in the WAG 2 Comprehensive RI/FS (Burns 1997). A proposed plan was published and public comments were considered in the WAG 2 ROD. The ROD was completed on December 22, 1997. As detailed below, both the proposed plan and the ROD briefly address the results of the ecological risk assessment.

Table C2-1-2-1. WAG 2 ERA results.

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-01	Yes	*COPCs:* Metals, PCBs, and other organic compounds
Site: TRA-02		*Contaminated Media*: Surface and subsurface soil
TRA Paint Shop Ditch (TRA-606)		*HQs:* Sb >1 and <10, Ag >1 and <10, Pb >1 and <10, Tl >10 and <100, Sn >10 and <100, Se >100 and <1000, benzo(b)fluoranthene >1 and <10: 4-chloroaniline, chrysene, PCBs, and Sr had HQs <target values
		Comment: The sampling performed under Track 2 investigations at the TRA Paint Shop Ditch provided the soil concentration used for the WAG 2 ERA. This site is believed to be contaminated with metals and organic compounds in both the surface and subsurface soils. However, the concentrations were found to be below risk-based levels for human health. Many contaminants (listed above) have HQs>1 and these must be included in the OU 10-04 ERA. Although PCBs not listed as a WAG ERA COPC, PCB concentrations are >EBSL. Chrysene, 4-chloroaniline, and Sr do not have a listed HQ in the WAG ERA, but concentrations are >EBSLs. TRA-02 is inside the TRA facility fence, where ongoing operations are expected to discourage ecological receptors from residing within the facility and should reduce the likelihood of exposure to contamination. However, the OU 10-04 ERA needs to consider TRA-02 contaminants with HQs >1 on an ecosystem-wide basis.
OU 2-04	Yes	*COPCs*: Acetone and radionuclides
Site: TRA-34		*Contaminated Media*: Surface and subsurface soil
TRA North Storage Area		*HQs:* Acetone >100 and <1000, radionuclides < target values.
		Comment: There was no risk assessment previously conducted for this site. Although acetone was listed as a COPC, no concentration was listed to conduct EBSL comparison. An HQ was however calculated for acetone, and because HQ is >1, it must be included in the OU 10-04 area. In the WAG ERA, radionuclides were eliminated based on <EBSL concentrations. The soil concentration area was removed in the summers of 1995 and 1996. Confirmation samples show that removal of contamination was effective; however, acetone (with a HQ >1) needs to be considered in the OU 10-04 ERA.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-04	No	*COPCs:* PCBs (Aroclor-1260)
Site: TRA-619		*Contaminated Media*: Subsurface soil
TRA PCB Spill at TRA-619		*HQs:* PCBs >1 and <10
		Comment: Additional information concerning the extent of surface contamination is needed. Information in the Track 2 Summary Report indicates that the vertical and lateral extent of PCB contamination has not been defined. Enough data do not exist to determine if PCBs are present in shallow surface soils at concentrations greater than the calculated risk-based soil concentration of 0.08 mg/kg for soil ingestion. The WAG ERA lists PCBs with a concentration >EBSLs and an HQ >1. The SLERA indicated that the data gap identified would be filled as part of the RI/BRA and included in the ERA. Though the WAG ERA shows concentrations are >EBSLs and an HQ >1, this site was eliminated from further assessment. The target value was exceeded for only one target group (AV210A, avian insectivores), and given the size of these sites, it is highly unlikely that the members of this group would have an exposure that would result in adverse effects.
OU 2-04	No	*COPCs:* PCBs (Aroclor-1260)
Site: TRA-626		*Contaminated Media*: Subsurface soil
TRA PCB Spill at TRA-626		*HQs:* PCBs >1 and <10
		Comment: Additional information concerning the extent of surface contamination is needed. Information in the Track 2 Summary Report indicates that the vertical and lateral extent of PCB contamination has not been defined. Enough data do not exist to determine if PCBs are present in shallow surface soils at concentrations greater than the calculated risk-based soil concentration of 0.08 mg/kg for soil ingestion. The WAG ERA lists PCBs with a concentration >EBSLs and an HQ >1. The SLERA indicated that the data gap identified would be filled as part of the RI/BRA and included in the ERA. Approximately 36 yd^3 of soil and concrete was excavated. Though the WAG ERA shows concentrations >EBSLs and an HQ >1, this site was eliminated from further assessment. The target value was exceeded for only one target group (AV210A, avian insectivores), and given the size of these sites, it is highly unlikely that the members of this group would have an exposure that would result in adverse effects and the site was therefore eliminated.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	*Description*
OU 2-04	No	*COPCs:* PCBs (Aroclor-1260)
Site: TRA-653		*Contaminated Media*: Surface and subsurface soil
TRA PCB Spill at TRA-653		*HQs:* PCBs >1 and <10
		Comment: Additional information concerning the extent of surface contamination is needed. Information in the Track 2 Summary Report indicates that the vertical and lateral extent of PCB contamination has not been defined. Enough data do not exist to determine if PCBs are present in shallow surface soils at concentrations greater than the calculated risk-based soil concentration of 0.08 mg/kg for soil ingestion. The WAG ERA lists PCBs with a concentration >EBSLs and an HQ >1. The SLERA indicated that the data gap identified would be filled as part of the RI/BRA and included in the ERA. After excavation of 8 cubic yards of contaminated soil, and backfilling with clean soil in 1990, the highest PCB concentration was 16 ppm under 4 feet of clean soil. Though the WAG ERA shows concentrations >EBSLs and an HQ >1, this site was eliminated from further assessment. The target value was exceeded for only one target group (AV210A, avian insectivores), and given the size of these sites, it is highly unlikely that the members of this group would have an exposure that would result in adverse effects.
OU 2-05	Yes	*COPCs*: Metals and organic compounds
Site: TRA-15		*Contaminated Media*: Surface and subsurface soil
TRA Hot Waste Tanks #2, #3, #4 at TRA-613		*HQs:* As >1 and <10, fluoride >100 and <1000
		Comment: The Track 2 investigation focused on the potential soil contamination in and around the tank site resulting from the leak from Tank #1. The investigation did not evaluate surface contamination although readings above the field screening level were encountered. The lack of this information was a SLERA data gap from conducting WAG 2 OU 2-13 Comprehensive RI/FS and BRA. radionuclides and organic compounds were eliminated based on <EBSL concentrations. To fill the SLERA data gap for the RI/BRA, a surface sample was collected from Borehole #3. Analytical results from the sample were used to characterize the surface contamination and risk posed by this area. WAG 2 addressed TRA-15 in its clean-up decision through a limited action preferred alternative, excavation with a disposal option contingency. This action consists of continuation of existing management control practices. Once the specified institutional controls are either no longer conducted or enforced, the risk to human health and environment would be equivalent to the No Action alternative. OU 10-04 ERA needs to evaluate TRA-15 contaminants As and fluoride.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-05 Site: TRA-16 *TRA Inactive Radioactive Contaminated Tank at TRA-614*	Yes	*COPCs:* As, Hg, U-234, and U-238 *Contaminated Media*: Surface and subsurface soil *HQs:* Hg >1 and <10; As, U-234 and U-238, HQ <target values. *Comment:* Hg must be evaluated in the OU 10-04 ERA. The WAG ERA shows that the concentrations for As and radionuclides from samples were either not detected or they did not pass the screen. Therefore, both As and the radionuclides were eliminated from further assessment. Although TRA-16 is considered a No-Action human health site, WAG 2 addressed TRA-16 in its clean-up decision for ecological concerns. TRA-16 is inside the TRA facility fence, where on-going operations are expected to discourage ecological receptors from residing and therefore, should reduce the likelihood of exposure to contamination. However, the OU 10-04 ERA needs to consider TRA-16 contaminant, Hg, with an HQ >1.
OU 2-05 Site: TRA-19 *TRA Rad Tanks 1 and 2 at TRA 630, Replaced by Tanks 1, 2, 3, and 4.*	Yes	*COPCs*: Co-60, Cs-134, Cs-137, and Sr-90 *Contaminated Media*: Surface and subsurface soil *HQs:* Radionuclides (internal): Cs-134 >1 and <10, Cs-137 >1 and <10; radionuclides (external): Cs-134 >1 and <10, Cs-137 >1 and <10; Co-60 and Sr-90 < target values. *Comment:* TRA-19 is defined as any environmental contamination resulting from releases associated with the original four catch tanks. Releases from the tanks are not suspected because the tanks were intact upon removal; however, subsurface contamination was detected during the removal operation and presumed to be associated with leaking warm waste lines (not associated with the tanks). The contaminated soil was not characterized or evaluated as part of the TRA-19 Track 2 investigation. The results of this sampling will be used in the ERA. Co-60 and Sr-90 were eliminated from further assessment based on <EBSL concentrations. Results of the Hot Tree Site samples were used to fill the TRA-19 SLERA data gap. The borings that were sampled were used to evaluate the same line that is presumed to be the leaking warm waste line described in TRA-19. WAG 2 addressed TRA-19 in its clean-up decision. The preferred alternative for TRA-19 is Limited Action with the contingency that if controls established under the limited action would not be maintained then an excavation and disposal option would be implemented to levels of intrusion (maximum of 10 feet or maximum depth at which contaminant concentrations exceed preliminary remediation goals, whichever is less) with disposal. OU 10-04 ERA needs to consider TRA-19 contaminants, Cs-134 and Cs-137, with HQs >1.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-07	No	*COPCs*: Cr^{+3}
Site: TRA-653 CR		*Contaminated Media:* Surface soil
TRA-653 Chromium-Contaminated Soil		*HQs:* NA
		SLERA Data Gap: No data on Cr^{+3} concentrations at TRA-653 were collected.
		Comment: To address the SLERA data gap, eight previous samples were collected in two sampling campaigns. Because the samples were collected using similar techniques and from the same area, the average concentration, 108.4 mg/kg was used in the dose calculations. Cr^{+3} was eliminated as a COPC because concentration was <EBSL, therefore site was eliminated as an ecological risk site.
OU 2-07	Yes	*SLERA COPCs:* Cr^{+6}
Site: TRA-36		*WAG ERA COPCs*: Metals
TRA ETR Cooling Tower Basin (TRA-751)		*Contaminated Media*: Surface and subsurface soil
		HQs: Cd >1 and <10, Se >10 and <100, Zn >10 and <100, Cr^{+6} <1.
		Comment: Data from the Track 2 sampling results were available to be used for the WAG 2 ERA. Although no HQ was listed for Cr^{+6}, concentration was >EBSL. WAG 2 addressed TRA-36 in its clean-up decision as a No Action Site citing that hexavalent chromium has been reduced to the less toxic trivalent state and/or is in the elemental state. However, the OU 10-04 ERA needs to evaluate TRA-36 contaminants Cd, Se and Zn with HQs >1.
OU 2-07	Yes	*COPCs*: Metals
Site: TRA-38		*Contaminated Media*: Surface and subsurface soil
TRA ATR Cooling Tower (TRA-771)		*HQs:* Sb >1 and <10, Hg >1 and <10, As >10 and <100, Pb >10 and <100, Tl >100 and <1000, Se >100 and <1000, Cr^{+6} <1
		Comment: Data from the Track 2 sampling results were available to be used for the WAG 2 ERA. Although no HQ was listed for Cr^{+6}, concentration was >EBSL. WAG 2 addressed TRA-38 in its clean-up decision. Although this site did not pose a human health concern, the site was evaluated for ecological concerns. However, TRA-38 is inside the facility fence, where ongoing operations are expected to discourage ecological receptors from residing within the facility and should reduce the likelihood of exposure to contamination. Therefore, the OU 10-04 ERA needs to evaluate TRA-38 contaminants Sb, Hg, As, Pb, Tl, and Se with HQs >1.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-07	No	*COPCs:* Cr^{+6} and Cr^{+3}
Site: TRA-39		*Contaminated Media*: Surface and subsurface soil
TRA MTR Cooling Tower North of TRA-607		*HQs:* Cr^{+6} and Cr^{+3} < target value *Comment:* Eliminated as a human health risk. No data were available for use in the WAG 2 ERA. Though the WAG ERA shows that no nonradionuclide HQs exceeded target values, Cr^{+6} concentration was >EBSL. Cr^{+3} concentration was <EBSL and Cr^{+6} was < target value in the HQ assessment. Therefore, TRA-39 was eliminated as potential risk site.
OU 2-09	Yes	*COPCs*: Metals, organic compounds, radionuclides
Site: TRA-08		*Contaminated Media*: Surface-sediment, subsurface soil, water
TRA Cold Waste Disposal Pond (TRA-702)		*HQs:* Ag >1 and <10, As >10 and <100, Cd >10 and <100, Cu >10 and <100, Pb >10 and <100, Hg >10 and <100, Ba >100 and <1000, Se >1000, Cr <1. *Comment:* Site was eliminated from the human health risk assessment. The TRA CWP is still used and will periodically receive liquid effluent, resulting in periods when surface water is available for animals to ingest. Sampling indicated sediment contamination at the TRA CWP. The contaminants identified in the sediments include carbon tetrachloride, tetrachloroethylene, tetrahydrofuran, 1,1,1-trichloroethane, xylene, and a suite of inorganics and radionuclides. Additionally, there is a potential for water contamination at the TRA CWP for which there are no available data. Although Cr^{+3} was <EBSL, WAG 2 WAG ERA states all metals for TRA-08 will be retained as part of the water ingestion pathway. However, no water HQ was calculated for Cr^{+3}. The Environmental Monitoring Unit at the INEEL has monitored effluent to the CWP on a quarterly basis. Samples are collected and analyzed for metals, organic compounds, and radionuclides. Effluent monitoring results from the first three quarters of 1995 will be used to characterize the water concentrations in the TRA CWP. The lesser of the upper confidence interval on the mean and the maximum observed concentrations is used in the ecological risk calculations for surface water concentrations at TRA-08. Although all organic compounds detected were <EBSLs, they were retained in the WAG ERA as part of the water ingestion pathway and some organic compounds will be assessed as part of the food and soil ingestion pathway. Radionuclide concentrations were <EBSLs and were eliminated. WAG 2 addressed TRA-08 ecological and human health concerns in its clean-up decision as excavation and disposal at an appropriate facility. However, the OU 10-04 ERA needs to consider TRA-08 contaminants, Ag, As, Cd, Cu, Pb, Hg, Ba and Se, with HQs >1.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-09	Yes	*COPCs*: Metals and organic compounds
Site: TRA-13		*Contaminated Media*: Surface and subsurface soil
TRA Final Sewage Leach Ponds (2) by TRA-732		*HQs:* Ag >1 and <10, Cu >10 and <100, Pb >10 and <100, Se >10 and <100, Zn >10 and <100, Hg >100 and <1000, benzo(b)fluoranthene <1, all radionuclides < target values.
		Comment: Although no HQs >1 were listed, benzo(b)fluoranthene concentrations were >EBSL. In the OU 10-04 ERA, TRA-13 contaminants with HQs >1 must be addressed, if a native soil cover is a deterrent for ecological receptor's needs to be determined. All radionuclides were eliminated based on concentrations <EBSL. WAG 2 addressed TRA-13 in its clean-up decision as a recommended alternative of containment with a native soil cover. OU 10-04 ERA needs to consider TRA-13 contaminants, Ag, Cu, Pb, Se, Zn, and Hg, with HQs >1.
OU 2-10	Yes	*COPCs*: Metals and radionuclides
Site: TRA-03B		*Contaminated Media*: Surface and subsurface soil
TRA Warm Waste Pond (Sediments)		*HQs:* Hg >10 and <100; radionuclides(internal): Cm-244 >0.1 and <1, Pu-238 >0.1 and <1, Am-241 >1 and <10, Pu-239/240 >1 and <10, Sr-90 >1 and <10; *radionuclides (external): all < target values; chrysene and* Cr^{+6} *were <1.* *Comment:* Cm-244 and Pu-238 were eliminated based on HQs<1. WAG 2 addressed TRA-03B in its clean-up decision as a preferred alternative of containment with an engineered cover protective of human and ecological intrusion. OU 10-04 ERA needs to consider TRA-03B contaminants Hg, Am-241, Pu-239/240, with HQs >1.
OU 2-11	Yes	*COPCs*: Acrylonitrile, metals, radionuclides (Co-60, Cs-137, U-234, U-238)
Site: TRA-04/05		*Contaminated Media*: Surface and subsurface soil
TRA Warm-Waste Retention Basin (TRA-712), Sampling Pi (TRA-764), and Sump (TRA-703)		*HQs:* acrylonitrile >10 and <100, Cu >1 and <10, Hg >1 and <10, Se >1 and <10, Tl >1 and <10, As >1 and <10, Pb >10 and <100
		Comment: The source and extent of contamination of Cs-137 and Co-60 in Retention Basin surficial sediments above 10 ft was unknown thus resulting in a data gap. However, contamination below 3 m (10 ft) has been adequately characterized. Extrapolating the data collected below 3 m (10ft) to soils above 3 m (10 ft) filled the extent of contamination SLERA data gap (surface soil previously unevaluated); therefore, additional data collection was not required. Co-60, Cs-137, U-234, and U-235 were eliminated from further assessment based on concentrations <EBSL. WAG 2 addressed TRA-04/05 in its clean-up decision as a no action site based on risks being within allowable levels. OU 10-04 ERA needs to evaluate TRA-04/05 contaminants, acrylonitrile, Cu, Hg, Se, Tl, As, and Pb, with HQs >1.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-13	Yes	*COPCs*: Inorganics and organic compounds
Site: TRA-06		*Contaminated Media*: Surface and subsurface soil
WAG 2 Comprehensive RI/FS including: TRA Chemical Waste Pond (TRA-701)		*HQs:* Sb >1 and <10, As >1 and <10, Ag >1 and <10, Sr >1 and <10, Sn >1 and <10, Tl >10 and <100, Pb >10 and <100, Ba >100 and <1000, Se >100 and <1000, Hg >1000, PCBs <1
		Comment: Native cover effectiveness against ecological intrusion needs to be determined. TRA-06 contaminants with HQs >1 need to be evaluated in the OU 10-04 ERA. WAG 2 addressed TRA-06 in its clean-up decision as a recommended alternative of containment with a native soil cover after excavation, selective treatment of the Hg-contaminated soils and disposal. However, evaluation of the native soil cover needs to be conducted to determine effectiveness of protecting ecological receptors. OU 10-04 ERA needs to consider TRA-06 contaminants Sb, As, Ag, Sr, Sn, Tl, Pb, Ba, Se, and Hg with HQs >1.
OU 2-13	No	*COPCs:* Organic compounds (solvents, fuel residues, oily wastes, phenol)
Site: TRA-41		*Contaminated Media*: Surface and subsurface soil
French drain associated with TRA-653 mechanical shop		*HQs:* Not assessed.
		Comment: Sampling was conducted on a french drain near TRA-653 on August 10, 1993. The analytical data indicated that this new site has probably been contaminated by TRA-653 mechanical shop operations. To fill the SLERA data gap, the sample results were sufficient to characterize the sludge material. The results of confirmation sampling were performed after the maintenance action and were included in the RI/BRA report as well as the ERA. Phenol was eliminated because concentrations were <EBSL. WAG 2 also recommended this site to be "No Action" based on the RI/BRA results.
OU 2-13	No	*COPCs*: Radionuclides (Co-60, Cs-137, Sr-90)
Site: Hot Tree Site		*Contaminated Media*: Surface and subsurface soil
Associated with leaks from hot waste line originating at TRA-641		*HQs:* Co-60, Cs-137, and Sr-90 were target values.
		Comment: Soil samples were collected to characterize this site, however, additional sampling was conducted to determine the extent of contamination. Results of the last sampling were used in the ERA which showed that unacceptable risk does not exist at this site. Co-60, Cs-137, and Sr-90 were eliminated based on concentrations <EBSLs.

Table C2-1-2-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 2-13	Yes	*COPCs*: Radionuclides (Co-60, Cs-134, Cs-137, Sr-90)
Site: Brass Cap Area		*Contaminated Media*: Surface and subsurface soil
Associated with warm waste line leaks near TRA-19		*HQs:* Radionuclides (internal): Cs-134 >1 and <10, Cs-137 >1 and <10; radionuclides (external): Cs-134 >1 and <10; Cs-137 >1 and <10, Co-60, and Sr-90 < target values.
		Comment: The Brass Cap Area is associated with the subsurface contamination detected near TRA-19 and is identified by a brass surface marker. The contamination of the soil is attributed to leaking warm waste lines in the vicinity of TRA-19. Several samples have been collected and are documented in an Unusual Occurrence Report (UOR EG&G-85-17, 1985). The data gap identified (site and risk previously unevaluated) was filled as part of the RI/BRA. Co-60 and Sr-90 were eliminated based on concentrations <EBSLs. WAG 2 addressed the Brass Cap Area in its clean-up decision as a limited action with the contingency that if the controls established under the limited action would not be maintained then an excavation and disposal option would be implemented to levels of intrusion (maximum of 10 feet or to the maximum depth at which contaminant concentrations exceed preliminary remediation goals, whichever is less) with disposal. OU 10-04 ERA needs to consider Brass Cap Area contaminants, Cs-134 and Cs-137, with HQs >1.
OU 2-13	No	*COPCs*: PCBs
Site: ETR stack		*Contaminated Media*: Surface and subsurface soil
PCB contamination near ETR stack		*HQs:* PCBs < target value.
		Comment: Site was eliminated based on a PCB HQ was <1.
OU 2-13	No	*COPCs*: Radionuclides (Agm-108, Am-241, Co-60, Cs-137, Sr-90)
Site: SLP-berm/SCA		*Contaminated Media*: Surface soil
Windblown Contamination		*HQs:* NA
		Comment: The available analytical data for this site were used to determine risk to the ecological receptors and no risk was apparent from these samples. All radionuclides were eliminated based on concentrations <EBSL. Site was eliminated because all HQs were <1.

C2-1-2.3.1 WAG 2 Proposed Plan

The WAG 2 proposed plan (INEEL Community Relations 1997) states that all sites with ecological risk greater than threshold levels are also sites with human health risks greater than allowable levels, except for the Paint Shop Ditch (TRA-02), the Radioactive Contaminated Tank at TRA-614 (TRA-16), and the Advanced Test Reactor Cooling Tower (TRA-38). Some level of ecological risk reduction is expected at all sites with human health risks, either by implementing institutional controls such as maintaining existing soil covers or by active remediation. Sites TRA-02, -16, and -38 are inside the facility fence, where on-going operations are expected to discourage ecological receptors from residing within the facility, thus reducing the likelihood of contamination exposure. However, the WAG 2 ERA provides input into the OU 10-04 ERA that determines risks to ecological receptors across the INEEL. The need for remedial action at sites posing an unacceptable ecological risk will be determined based on the results of the OU 10-04 ERA. The WAG 2 proposed plan (INEEL Community Relations 1997) goes on to state that the WAG ERA incorporates various adjustment factors that were designed to be conservative, and the associated risks are most likely overestimated. Remediation that will be performed to reduce human health risks will also help to minimize WAG 2 ecological risk. Because of the small site size, and conservatism of the WAG 2 ERA, the proposed plan states that no significant ecological impact is anticipated from the listed sites of ecological concern. Therefore, no action at these sites, solely for ecological protection, is recommended at this time.

C2-1-2.3.2 The WAG 2 ROD

The WAG 2 ROD (DOE, EPA, IDHW) lists 12 sites that pose potential risk to ecological receptors. TRA-36 is listed as a site of concern because cadmium, selenium, and zinc were above an HQ of 1; these concentrations, however, are at background levels and not considered a problem at this site. The results of the assessment for the 11 remaining sites posed the following potential risk to ecological receptors: from internal and external exposure to radionuclides at the Brass Cap Area and TRA-19; from internal exposure to radionuclides at TRA-03, as well as a metal at TRA-03; and from both metals and organic compounds at TRA-02, TRA-04/05, TRA-06, TRA-08, TRA-13, TRA-15, TRA-16, and TRA-38. TRA-08, TRA-15, TRA-19 and the Brass Cap Area are associated with active systems at TRA and are being addressed through the facility assessment performed as part of the RI/BRA. TRA-02, TRA-04/05, TRA-06, TRA-13, TRA-16, and TRA-38 are also associated with facilities operations.

The WAG 2 ROD (DOE, EPA, IDHW) also states that a basic assumption of the ERA is that, under a future use scenario, the contamination is present at an abandoned site that will not be institutionally controlled. In actuality, facility assessment sites are currently in use and institutional controls will remain in place until they are decommissioned. Because these sites are at an industrial facility currently in use, they most likely do not contain desirable or valuable habitat. The absence of habitat, the existence of facility activities, and institutional controls will minimize the exposure of ecological receptors.

The ERA determined that risks to ecological receptors exist at 12 sites at WAG 2. Four sites (TRA-03, TRA-06, TRA-07, and TRA-13) are outside the TRA facility fence. Human health risks exceeding allowable levels exist at these sites, and some level of remediation ranging from institutional controls to active remediation will be required. The ROD (DOE, EPA, IDHW) states that any remedial alternative that reduces human health risks would be expected to also reduce ecological risks. The remaining sites are inside the facility fence, where ongoing facility operations result in limited ecological exposures, as discussed previously. The relatively small size of these sites, including TRA-02, -16, and -38, would also likely result in little or no ecological risks.

The conservative nature of the WAG 2 ERA resulted in many sites and contaminants being indicative of potentially unacceptable risk to ecological receptors. The increased conservatism results from conservative exposure calculations and the method of determining the extent of contamination and characterizing exposure concentrations at each release site. It is anticipated that additional modeling performed at the OU 10-04 level will reevaluate the potential risk at a more ecologically relevant level.

C2-1-3. WAG 3 ERA SUMMARY

The WAG 3 ERA was completed and is documented in the *WAG 3 Comprehensive RI/FS* (DOE-ID 1997). The assessment was performed using the results of a previously conducted screening level ecological risk assessment (SLERA) and the basic methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et. al. 1995) hereafter called the Guidance Manual. The WAG 3 SLERA was conducted to screen sites identified in the FFA/CO (DOE-ID 1991) and to identify those contaminants present at WAG 3 that have the potential to cause undesirable ecological effects. The sites and contaminants identified in the assessment, in addition to those sites for which inadequate sampling information existed for inclusion in the SLERA, are analyzed here for use in the OU 10-04 baseline ERA.

C2-1-3.1 Summary of WAG 3 Site Screening

Sites identified in the FFA/CO (DOE-ID 1991) were initially eliminated from consideration in the WAG 3 SLERA analysis because they were uncontaminated (i.e., no source to the environment) or inaccessible to the ecosystems of concern (i.e., no pathway to the environment). All sites identified at WAG 3 were reviewed for possible elimination from consideration in the WAG 3 ERA for similar reasons. The *WAG 3 Comprehensive RI/FS* (DOE-ID 1997) provides a table of the eliminated sites and accompanying justification.

While the WAG 3 SLERA provided an initial screening of contaminant at WAG 3, new potentially contaminated sites and new data from previously identified sites became available for the RI/FS. In the WAG 3 ERA, a screening of sites and contaminants against both background concentrations and ecologically based screening levels (EBSLs) was conducted. The background concentrations come from Rood et al (1995). All EBSLs were calculated specifically for use at the INEEL using the methodology presented in the *Guidance Manual* (VanHorn et al. 1995). The stepwise decision process for including a contaminant in the WAG ERA was as follows:

1. Determine the contaminant concentration at the site.

   - If the site concentration (usually the maximum) of the contaminant does not exceed the 95% upper tolerance limit (UTL) for background concentrations, then the contaminant will not be considered in the ERA for that site.

   - If the site concentration of the contaminant does not exceed the EBSL, then the contaminant will not be considered in the WAG ERA for that site.

   - Otherwise, the contaminant is included in the WAG ERA for the site.

   - Sites where all contaminants were eliminated, were not considered in the WAG ERA.

2. Conduct a risk analysis of the WAG 3 retained sites to assess exposure to contaminants and potential effects of exposure. These activities were conducted interactively to ensure the methods used to assess exposure and effects are compatible. Assessing exposure and effects was based on the ecological endpoints and conceptual model derived during the problem formulation presentation. The analysis objective was to estimate the magnitude, frequency, duration, and route of exposure to site-related contaminants by ecological receptors.

3. The WAG 3 ERA risk evaluation was conducted to determine whether there is any indication of risk due to the contaminant concentrations and exposure parameter-calculated dose for INEEL functional groups, T/E, and sensitive species and discuss the uncertainty inherent in the assessment.

The final list of sites included in the WAG 3 ERA are presented in Table C2-1-3-1. Many of the sites listed with ecological concerns were eliminated from the human health assessment. These sites typically did not pose a significant risk to human health but did indicate some existing contamination. Since the decision to include or not include sites for human health risk assessment does not address ecological risks, these sites were retained for the WAG 3 ERA

C2-1-3.2 WAG 3 Ecological Risk Assessment

The sites that pose a potential ecological risk and include the corresponding COPCs and HQs, where available, are shown (see Table C2-1-3-1). The results of this assessment will be incorporated into the OU 10-04 ERA. As part of the OU 10-04 ERA, it is expected that TRV values will be reviewed, a less conservative modeling approached evaluated, and a population/community assessment methodology developed. The results of the WAG SLERAs and ERAs will be summarized and used to evaluate overall risk to INEEL ecological receptors. Results of the OU 10-04 ERA will be compared to the WAG 3 ERA results.

C2-1-3.3 Status of WAG 3 Ecological Investigations

WAG 3 completed both the WAG 3 SLERA and the WAG ERA. Currently WAG 3 is incorporating agency comments to the RI/FS summarized in Table C2-6-2 [refer to Appendix C2] and developing a proposed plan that will address alternatives for the ecological sites of concern.

Table C2-1-3-1. WAG 3 ERA results.[a]

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-01	No	*COPCs:* PCBs
Site: CPP-49		*Contaminated Media*: Surface soil
PCB Transformer Yard (CPP-705)		*HQ*: PCBs < target value
		Comment: In the WAG ERA, PCBs were eliminated based on HQ analysis.
OU 3-01	No	*SLERA/WAG ERA COPCs:* PCBs
Site: CPP-51		*Contaminated Media:* Surface soil
PCB Staging Area West of CPP-660		*HQ*: PCBs < target value
		Comment: In the WAG ERA, PCBs were eliminated based on HQ analysis.
OU 3-01	No	*COPCs:* PCBs and radionuclides
Site: CPP-61		*Contaminated Media:* Surface soil
PCB Spill in CPP-718 Transformer Yard		*HQ*: PCB and radionuclides < target values.
		Comment: In the WAG ERA, radionuclides were either <EBSLs or background and the PCB HQ was < target value. Therefore, both contaminants were eliminated.
OU 3-02	Yes	*SLERA COPCs:* Radionuclides, methylene chloride, Hg
Site: CPP-37A		*WAG ERA COPCs*: Hg
CPP Gravel Pit #1		*Contaminated Media:* Surface and subsurface soil
		HQ: Hg >1 and < 100
		Comment: In the WAG ERA, radionuclides and methylene chloride were either < EBSLs or background, and therefore eliminated. WAG 3 must address CPP-37A Hg concentrations in its clean-up decision (i.e., monitoring, clean-up, etc). Hg should be evaluated in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-02	No	*COPCs:* Radionuclides
Site: CPP-37B		*Contaminated Media:* Surface and subsurface soil
CPP Gravel Pit #2		*HQ:* NA
		Comment: In the WAG ERA, radionuclides were either <EBSLs or background and therefore eliminated
OU 3-02	Yes	*COPCs:* Organic compounds and metals (As, Hg).
Site: CPP-54		*Contaminated Media*: Surface and subsurface soil
Drum Storage Area West of CPP-606		*HQ:* Hg >1 and <100, As < target value, di(2-ethyhexyl)phthalate <target value
		Comment: Eliminated as a human health risk, but some contamination existed and therefore need to address ecological risks. Characterization results indicate organic compound and metals concentrations were either below human risk-based concentrations or below background values. However, for ecological concerns the site showed potential risk to environment for Hg. It should be noted, As and di(2-ethylhexyl)phthalate were > EBSLs, yet were not listed as COPCs for HQ analysis because both were < target values. Mercury however was > EBSL and had an HQ >1. WAG 3 must address CPP-54 Hg concentrations in its clean-up decision (i.e., monitoring, clean up, etc). Hg needs be evaluated in the OU 10-04 ERA.
OU 3-02	Yes	*COPCs:* Metals
Site: CPP-55		*Contaminated Media:* Surface soil
Hg contaminated Area South of CPP-T-15		*HQs*: Hg >1 and <1000, As >1 and <10, Cr^{+6} >1 and <100, Pb >1 and <100, Ni >1 and <100, Se >1 and <10, Cr^{+3} >1 and <100 (for plants only, functional groups and C2 species had HQ<1), Ag >1 and <10.
		Comment: Eliminated as a human health risk, but some contamination existed and therefore need to address ecological risks. Characterization results indicate concentrations of organic compounds, Cr, Pb, and Hg were measured either below human risk-based concentrations or below background values. The greatest risks are due to Hg contamination. As, Cr^{+6}, Pb, Ni, Se, and (to a lesser extent) Ag are also potential risk drivers. Plants at this site are also potentially at risk from Cr^{+3} concentrations. WAG 3 must address CPP-55 Hg, As, Cr^{+6} and Cr^{+3}, Pb, Ni, Se, and Ag concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-02	No	*COPCs:* Kerosene
Site: CPP-59		*Contaminated Media*: Surface soil
Kerosene Tank Overflow West of CPP-633 Zone 1		*Comment*: Eliminated as a human health risk, but indicated some contamination existed and therefore ecological risks needed to be further addressed. The WAG ERA stated "xylenes were all less-than-detectable."
OU 3-02	No	*COPCs:* Kerosene
Site: CPP-59		*Contaminated Media*: Surface soil
Kerosene Tank Overflow West of CPP-633 Zone 2		*HQ:* Xylene >1 and <10 *Comment*: Eliminated as a human health risk, but indicated some contamination existed and therefore ecological risks needed to be further addressed. The WAG ERA stated "xylenes were all less-than-detectable."
OU 3-02	Yes	*COPCs:* Inorganics
Site: CPP-65		*Contaminated Media:* Surface water
Sewage Treatment and Plant Lagoons		*HQ*: no benchmark for total P *Comment:* This site was eliminated from the human health investigation. These facilities receive wastewater from the sewage treatment plant, which receives sanitary waste from 31 buildings at the CPP. The lagoons are still in use and the inorganic COPCs were assessed using liquid effluent concentrations and were screened against toxicological benchmarks. No benchmarks exist for total P and therefore this contaminant and site remains as a data gap. Determine a benchmark concentration for total P and conduct a screening. If retained, then WAG 3 must address CPP-65 total P concentrations in its clean-up decision (i.e., monitoring, clean up, etc). Total P also needs to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-02	Yes	*COPCs*: Metals (Sb, B, fluoride, Mo, Se, Sr, (Sn and Sb < detectable), and radionuclides.
Site: CPP-66		*Contaminated Media:* Surface and subsurface soil
CPP CFSGP Fly Ash Pit		*HQs:* B >1 and <1000, fluoride >1 and <100, Se >1 and <100, Sr >1 and <10, Sb <1, and Mo <1. All radionuclides were <EBSLs. *Comment:* This site was eliminated from the human health investigation. This pit shows potential ecological risk from a number of inorganic contaminants. B is the major risk driver, with fluoride, Mo, Se, and Sr also creating potential risk. These calculations used the fly ash concentrations rather than soil concentration data, since they were the only concentrations available. It is not known whether the soil around and below the pit is contaminated. Due to the poor sorptive qualities of the substrata below the ash pit and the low concentrations of constituents in the source material, it is unlikely that higher concentrations have accumulated in the subsurface. While a Track 1 decision document was approved and recommended for NFA for human health in 1994, the decision is to be revisited in the ROD with respect to solid waste regulations. No HQ was calculated for Sb because no concentration was available. Contaminants remaining for OU 10-04 ERA include Sb, B, fluoride, Mo, Se. Sn was screened based on concentrations less than detection (at <1.5 mg/kg) which is both < EBSL and background concentration for Sn. Sb concentrations were < detection (7.5 mg/kg), which is both the EBSL and the background concentration. Therefore, Sb should be retained. WAG 3 must address CPP-66 Sb, B, fluoride, Mo, Se concentrations in its clean-up decision (i.e., monitoring, clean-up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-03	Yes	*COPCs:* Organic compounds, metals, and radionuclides
Site: CPP-67		*Contaminated Media:* Sediments and surface water
PP Percolation Ponds #1 and #2 Sediments		*HQ*: Hg >1000, benzo(b)fluoranthene <1000, benzo(a)pyrene <100, cyanide <100, Se <100, Co <10, Cu <10, Ag <10; radionuclides (internal): Co-60 <1, Np-237<10, Pu-238 <10, Am-241<1, Pu-239<1, U-234<1, U-238<1; radionuclides (external): all <target values.
		Comment: No COPCs. Footnote on COPC table of RI/FS states CPP-67 does not have any contaminant concentrations that exceed the screening limit for soil. Human health data has sediment concentrations, but surface water concentrations are not available. Note that HQs were obtained for contaminants listed below. CPP-77 ponds do not have any contaminant concentrations that exceed the screening limits for soil. The radionuclides were evaluated as potentially ingested in water by wildlife. The percolation ponds showed potential ecological risk from internal exposure to the alpha emitters Am-241, Np-237, Pu-238, Pu-239, U-234, and U-238 to the fauna. Additionally, a number of nonradioactive contaminants cause risk including Hg, benzo(b)fluoranthene, benzo(a)pyrene, cyanide, Se, Co, Cu, and Ag. The human health data include sediment concentrations; surface water concentrations are not available. In WAG ERA some organic contaminants were screened on EBSL and background analysis. WAG 3 must address CPP-67 Hg, benzo(b)fluoranthene, benzo (a)pyrene, cyanide, Se, Co-60, Cu, Ag, Np-237, Pu-238, Am-241, Pu-239, U-234, U-238 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in OU 10-04 ERA.
OU 3-05	Yes	*WAG ERA COPCs*: PCBs, organic compounds, As, Ni, Ag, Hg, Se, and radionuclides
Site: CPP-14		*Contaminated Media:* Surface and subsurface soil
Imhoff Tanks, Plant Site, Drain Field		*HQs*: As >1 and <10, Ni >1 and <100, Hg >1 and <100, 4-chloroaniline >1 and <10
		Comment: This site has potential risk from metals and 4-chloroaniline. As is a potential risk at this site; the source term was 4.73 mg/kg with a maximum observed value of 8.6 mg/kg, which slightly exceeds the average background concentration and UTL values of 4.46 and 5.8 mg/kg, respectively. Hg and Ni also contribute risk at this site. In the WAG ERA, radionuclides are < EBSLs or background concentrations. WAG 3 must address CPP-14 PCBs, organic compounds, Ni, Ag, Hg, and Se concentrations in its clean-up decision (i.e., monitoring, clean-up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-06	Yes	*COPCs:* As, Hg, and Sr-90
Site: CPP-34		*Contaminated Media:* Surface soil
Soil Storage Area in the NE Corner of CPP		*HQs*: As >1 and <10, Hg >1 and <100; Sr-90 (internal) >1 and <10, Sr-90 (external) < target values.
		Comment: This site, which was used to store radioactively-contaminated soil, showed elevated potential ecological risks from metals and internal exposure to radionuclides. The metals causing potential risk are As and Hg. Both the source term concentration and maximum observed concentration of As were 7.1 mg/kg, as compared to a background average concentration and UTL of 4.46 and 5.8 mg/kg, respectively. WAG 3 must address CPP-34 As, Hg, Cs-137, and Sr-90 concentrations in its clean-up decision (i.e., monitoring, clean-up, etc.). These same contaminants need to be evaluated in the OU 10-04 ERA. Note: Past WAG 3 documentation indicates Cs-137 was evaluated at this site, although it is not a COPC.
OU 3-06	Yes	*COPCs:* Radionuclides, Cr, Pb, and fluorides
Site: CPP-40		*Contaminated Media:* Surface soil
Lime Pit at the Base of the CPP-601 Berm and French Drain		*HQs:* Cr^{+3} >1 and <100 (for plants only; functional groups and C2 species had HQ <1), Pb >1 and <10
		Comment: This site was eliminated from the human health investigation, however contamination remains. This pit was filled with powdered lime to neutralize the HF. This site shows elevated ecological risk from exposure to Pb and (to a lesser extent) fluoride. Plants at this site are also potentially at risk from Cr^{+3} concentrations, however it was not listed as a WAG ERA COPC or was an EBSL recorded. In the WAG ERA, radionuclides were <EBSLs or background concentrations, therefore radionuclides were eliminated as a COPC. WAG 3 must address CPP-40 Pb, fluoride, and Cr^{+3} (plants only) concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-06	No	*COPCs:* Fluoride
Site: CPP-47		*Contaminated Media:* Surface soil
Pilot Plant Storage Area West of CPP-620		*HQ*: Fluoride >1 and <10
		Comment: This site was eliminated from the human health investigation, however potential contamination remains. Sometime in 1984, approximately 2 gal of HF were spilled at this site. It is assumed that the HF has reacted in the soil, therefore this site will be assessed for fluoride. In WAG ERA, the fluoride HQ was < target value. Therefore, contaminant was eliminated from further consideration.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-08	Yes	*COPCs:* As, Hg, Cs-137, and Sr-90
Site: CPP-13		*Contaminated Media:* Surface soil
Pressurization of the Solid Storage Cyclone northeast of CPP-13		*HQs:* Hg <10, Sr-90 <10
		Comment: Pressurization of the solid storage cyclone northeast of CPP-13, indicated ecological risk from exposure to Hg. There is a potential risk from internal ingestion of Sr-90. As and Cs-137 were both were < EBSLs or background. WAG 3 must address CPP-13 Hg and Sr-90 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-09	No	*COPCs:* Radionuclides
Site: CPP-06		*Contaminated Media:* Surface and subsurface soil
Trench East of CPP--603 Fuel Storage Basin		Comment: In WAG ERA, other radionuclides were <EBSLs or background.
OU 3-09	Yes	*COPCs*: As, Co-60, Cs-137, Eu-152, Eu-154, and Sr-90
Site: CPP-19		*Contaminated Media:* Surface and subsurface soils
CPP-603 to CPP-604 Line Leak		*HQs*: As >1 and <10; radionuclides (internal): Cs-137 >1 and <100, Eu-152 >10 and <100, Eu-154 >1 and <10, Sr-90 >1 and <100, Co-60 >1 and <10; radionuclides (external): all < target values
		Comment: This site shows potential ecological risk from As and internal exposure to radionuclides. The source term concentration for As, 5.95 mg/kg, and the maximum observed concentration, 6.3 mg/kg, which slightly exceeds the average background concentration and UTL values of 4.46 and 5.8 mg/kg, respectively. The radionuclides showing potentially elevated risks from internal exposure include Co-60, Cs-137, Eu-152, Eu-154, and Sr-90. In WAG ERA, other radionuclides were <EBSLs or background. WAG 3 must address CPP-19 As, Co-60, Cs-137, Eu -152, Eu-154, and Sr-90 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-09	No	*COPCs:* Radionuclides
Site: CPP-22		*Contaminated Media:* Surface soil
Particulate Air Release South of CPP-603		*Comment:* No source; contaminated soil reportedly was removed. In WAG ERA, radionuclides were <EBSLs or background.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-09	No	*COPCs:* Radionuclides, metals (Cr, Pb) and fluorides
Site: CPP-78		*Contaminated Media:* Surface and subsurface soil
Contaminated soil west of CPP-693, East of Dry Fuel Storage Area		*HQ:* All < target values. *Comment:* In WAG ERA, radionuclides were <EBSLs or background. Other contaminants had HQs < target values.
OU 3-10	Yes	*COPCs:* Metals, fluoride, nitrate
Site: CPP-42		*Contaminated Media:* Surface and subsurface soil
Drainage Ditch West of CPP-637		*HQ*: Ba >1 and >1000 (1,368.68), fluoride <EBSL. *Comment*: This site was eliminated from the human health investigation, however potential contamination remains. It is suspected that laboratory wastes may have been transported manually from CPP-637 and released to the soil at CPP-42. Ba, fluoride, and nitrate have been observed in soil samples collected at the site. Nitrate and fluoride were eliminated based on EBSL comparisons, Ba was the only contaminant with potential risk. WAG 3 must address CPP-42 Ba, and fluoride concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-10	Yes	*COPCs*: Pb, Hg, Cr^{+3}, Cr^{+6}, Ni, Cd, and organic compounds
Site: CPP-44		*Contaminated Media:* Surface and subsurface soil
Grease Pit South of CPP-608		*HQs*: Cd >1 and <1000, Cr^{+3} >1 and <1000, Pb >1 and <100, Hg >1 and <100, Cr^{+6} >1 and <10 (for plants only), Ni >1 and <10; decanal was not assessed. *Comment*: This site was eliminated from the human health investigation, however potential contamination remains. The pit consists of a 12.5 by 5.2 m (41 by 17 ft) concrete pad with a 7.6 by 0.9 by 1.7 m (25 by 3 by 5.5 ft) trench in the middle, which contained a sump. The trench may have been used for disposal of petroleum products. The area has been taken out of service and covered with gravel. A number of inorganic and organic compounds have been detected in soil samples collected at the site. The metals showed elevated ecological risks from exposure to metals. The largest potential risk is from exposures to Pb and Hg. Other metal contaminants resulting in increased risks are Cd, Cr^{+3} (solely to plants), Cr^{+6}, and Ni. Additionally, there was no toxicity data for decanal, which was observed at 0.009 mg/kg. WAG 3 must address CPP- 44 Pb, Hg, Cr^{+3} and^{+6}, Ni, Cd, and decanal concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-10	No	*COPCs:* Radionuclides
Site: CPP-46		*Contaminated Media:* Surface and subsurface soil
CPP-637 Courtyard Pilot Plant Release		*Comment:* Potential radionuclide contamination may still remain. In WAG ERA, radionuclides were <EBSLs or background.
OU 3-10	Yes	*SLERA COPCs:* Nitrate
Site: CPP-56	nitrate	*WAG ERA COPCs:* None listed. However, a footnote to COPC Table 28-10 of the WAG 3 RI/FS states that nitrate is the only potential contaminant identified in the Track 2 Draft Final Scoping Summary Report for WAG 3 OU 10 Site CPP-56, but no concentration data for nitrate at this site were available. The EBSL for nitrate is 4.68 mg/kg.
Nitric Acid Contamination South of CPP-734		*Contaminated Media:* Surface and subsurface soil
		Comment: This site was eliminated from the human health investigation, however potential contamination remains. Approximately 5,000 liters of dilute nitric acid were released to the surrounding soil. Records indicate that the acid had been neutralize by sodium hydroxide before transfer. The site was partially excavated during the construction of building CPP-796. The Track 2 analysis considered nitrate a potential contaminant at this site. WAG 3 must address CPP- 56 nitrate concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-13	Yes	*COPCs:* Metals (Ba, Hg, Ag), fluoride, and organic compounds
Site: CPP-39		*Contaminated Media:* Surface and subsurface soil
CPP HF Storage Tank (YDB-105) and Dry Well		*HQs:* Ba <1 and <1000 (3,999.50), fluoride >1 and <100, Hg >1 and <10, Ag >1 and <10, di-2-ethylhexylphthalate >1 and <10
		Comment: This site was eliminated from the human health investigation, however potential contamination remains. HF was transferred from the tank to CPP-601 before the dissolution process. Only off-specification solution was returned to the contaminant vault for neutralization. The tile line was removed in 1993. No radioactive constituents were associated with this process. A number of inorganic and organic compounds have been detected in soil samples collected at the sites. Results indicate elevated ecological risks from metals and organic compounds. Exposure to Ba and fluoride contributes the most significant risk. Hg, Ag, and (to a lesser extent) di-2-ethylhexphthate also contribute to elevated potential risks. In the WAG ERA, several organics were eliminated based on the EBSL or background analysis, however many organics were above the EBSLs or background. WAG 3 must address CPP- 39 organic compounds, Ba, fluoride, Hg, Ag concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-13	Yes	*COPCs*: Hg and radionuclides
Site: CPP-48		*Contaminated Media:* Surface and subsurface soil
French Drain South of CPP-633		*HQ*: Hg >1 and <10 (plants only)
		Comment: This site was eliminated from the human health investigation, however potential contamination remains. The chemicals deposited in the dump tank were not treated or neutralized before being released. The dump tank was removed in 1993. Hg, Cs-137, Sb-125, Eu-155, and Sr-90 have been detected in samples collected at the site. In the WAG ERA, radionuclides were < EBSL or background. Only Hg poses a potential risk to the ecological receptors. WAG 3 must address CPP-48 Hg contamination in its clean-up decision (i.e., monitoring, clean up, etc). Hg also needs to be evaluated in the OU 10-04 ERA.
OU 3-13	Yes	*COPCs:* Acetone and asbestos
Site: CPP-84		*Contaminated Media:* Subsurface soil
B*uried Gas Cylinder Site*		*HQ:* Acetone >1 and <1000
		Comment: This site was eliminated from the human health investigation, however, potential contamination remains. This site consists of 40 to 100 gas cylinders buried in a trench. The only contaminants of concern were determined to be acetone and asbestos (fillers in acetylene cylinders). It is not clear that any acetone has leaked from the buried cylinders. Chemical biodegradation studies indicate that the biodegradation of acetone in sediments and soils will be significant and it is not anticipated that CPP-84 would remain a site of concern based on this rationale. Assume acetone no longer exists due to biodegradation. Contaminants need to be included in the OU 10-04 ERA.
OU 3-13	Yes	*COPCs*: Metals (Cd and Hg)
Site: CPP-86		*Contaminated Media:* Surface and subsurface soil
CPP-602 Waste Trench Sump		*HQs*: Hg >1 and <10, Cd >1 and <1000
		Comment: This site was eliminated from the human health investigation, however, potential contamination remains. Process waste generated in CPP-602 is collected using a waste trench that underlies the basement level of CPP-602, which houses laboratories and offices that provide plant analytical support. Inorganic contaminants have been detected in samples collected at this site. Results showed a slight potential ecological risk from Hg and Cd contamination. WAG 3 must address CPP-86 remaining Hg and Cd concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-13	No	*COPCs:* Metals
Site: CPP-87		*Contaminated Media:* Subsurface soil
VOG Blower Cell Floor Drain/Sump and PEW Evaporator Feed Pump Cell		*Comment:* This site was eliminated from the human health investigation, however potential contamination remains. In 1990, when a new piping system was installed, soil samples were collected and metals were detected. Currently, the system operates and collects hazardous wastes from several buildings. Contamination below background or human risk-based concentrations is thought to exist. In the WAG ERA, metals with the exception of Ba were eliminated because metals were < EBSLs and/or background. WAG 3 must address CPP-87 remaining Ba concentration in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-13	Yes	*COPCs:* Metals (As, Hg, Ni) and radionuclides
Site: CPP-88		*Contaminated Media:* Surface and subsurface soil
Radiological Contaminated Soils Map		*HQs:* Hg >1 and <100, Ni >1 and <100, As >1 and <10; radionuclides <EBSLs
		Comment: Contaminated soil remains across the facility indicating potential ecological risk from metals. As concentrations ranged from 3.5 to 7.1 mg/kg and 5.9 mg/kg was used as the soil concentration. The background average and UTL concentrations for As are 4.46 and 5.8 mg/kg, respectively. WAG 3 must address CPP- 88 remaining Hg, Ni, and As concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 3-13	Yes	*COPCs:* Metals, (Sb, As, Hg), organic compounds, and radionuclides
Site: CPP-90		*Contaminated Media:* Surface and subsurface soil
CPP-709 Ruthenium Detection		*HQs*: As >1 and <100, Hg >1 and <100, Sb >1 and <10; radionuclides <EBSLs; indeno(1,2,3-cd)pyrene < target value.
		Comment: Metals concentrations potentially cause risk to the environment. The primary risk drivers are As and Hg. Sb concentrations were large enough to show a slight potential risk. In the WAG ERA, radionuclides were < EBSLs or background. Indeno(1,2,3-cd)pyrene was less than target values in HQ analysis. WAG 3 must address CPP- 90 remaining Sb, As, Hg, and organic compound concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 3-13	Yes	*COPCs:* Metals (Al, Hg)
Site: CPP-93		*Contaminated Media:* Surface and subsurface soil
Simulated Calcine Trench		*HQs*: Al >1 and >1000 (3,657.92), Hg >1 and >1000 (2,267.82)
		Comment: The simulated waste calcine trench is a significant potential ecological risk from both Al and Hg. From the toxicity standpoint, both the Al and Hg toxicity values are based on organic compounds containing these chemicals. It is not clear for Al that the flora and fauna would be exposed to such organic compounds, since the simulated calcine material is inorganic. WAG 3 must address CPP-93 Al and Hg concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
OU 10-06	No	*COPCs:* Radionuclides
Site: Windblown		*Contaminated Media:* Surface and subsurface soil
Windblown Area		*Comment:* In WAG ERA, radionuclides were <EBSLs or background concentration.
Tank Farm Group	Yes	*COPCs*: Fluoride, Hg, and radionuclides (Am-241, Co-60, Cs-134, Cs-137, Eu-154, Pu-239, Pu-241, Sr-90, U-235)
		Contaminated Media: Surface and subsurface soil
		HQs: As >1 and <10, Hg >1 and <10; radionuclides (internal): Cs-137 >1 and <1000, Sr-90 >1 and <1000, Am-241 >1 and <100, U-235 >1 and <100, Pu-239 >1 and <10; radionuclides (external): Cs-137 >1 and <1000
		Comment: Metals and radionuclides showed significant ecological risk. Hg concentrations are large enough for a slight potential environmental risk. For internal exposure, Cs-137 and Sr-90 caused the largest risk, while Am-241 and U-235 caused lesser risks and Eu-154 and Pu-239 caused a slight potential risk. For external exposure, Cs-137 concentrations show a potential risk, while Eu-154 concentrations show only a slight potential risk. In the WAG ERA, nitrate and toluene were <EBSLs, and therefore eliminated. WAG 3 must address Tank Farm Group fluoride, Hg, Am-241, Co-60, Cs-134, Cs-137, Eu-154, Pu-239, Pu-241, Sr-90, U-235 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
Tank Farm South Group	Yes	*COPCs:* Metals (As, Cd, Hg, Ni) and Cs-137 organic compounds *Contaminated Media:* Surface and subsurface soil *HQs:* Hg >1 and <100, Cd >1 and <1000, As >1 and <10, Ni >1 and <100; radionuclides (internal and external): all < target values. *Comment*: In WAG ERA, organic compounds were <EBSLs, and were eliminated. This site showed ecological risk from metals and a slight risk from internal and external exposure to Cs-137. As, Cd, Hg, and Ni concentrations are high enough to pose risks to the environment. These source term and maximum concentrations for As were 3.9 and 5.9 mg/kg, respectively, which are close to the background average and UTL values of 4.46 and 5.8 mg/kg, respectively. WAG 3 must address Tank Farm South Group As, Cd, Hg, Ni, Cs-137 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
Waste Calcine Facility (WCF) Group	Yes	*COPCs*: Metals (As, Hg, Ni), and radionuclides (Am-241, Cs-134, Cs-137, Eu-154, Sr-90) *Contaminated Media:* Surface and subsurface soil *HQs*: As >1 and <10; Hg >10 and <100; Ni >1 and <10; radionuclides (internal) Sr-90 >1 and <100, Am-241 >1 and <100, Eu-154 <1; radionuclides (external): all < target values *Comment*: This area has concentrations of metals and radionuclides which pose a potential ecological risk. The metals driving risk are As, Hg, and Ni. The source term and maximum concentrations for As were 5.5 mg/kg and 6.3 mg/kg, respectively, which are close to the background average and UTL values of 4.46 and 5.8 mg/kg. Sr-90 and Am-241 concentrations caused a potentially significant risk from internal exposure, while Cs-134 and Cs-137 concentrations indicate a slight risk from external exposure. WAG 3 must address WCF group As, Hg, Ni, Am-241, Cs-134, Cs-137, Eu-154, Sr-90 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.

Table C2-1-3-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
Old Storage Pool Group	Yes	*COPCs*: Metals (As, Hg, Ni), and radionuclides (Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Sr-90) *Contaminated Media:* Surface and subsurface soil *HQs:* As >1 and <10, Hg >1 and <100, Ni >1 and <10; radionuclides (internal): Cs-137 >1 and <10, Eu-152 >1 and <10, Eu-154 >1 and <10; radionuclides (external): Cs-137 >1 and <10, Eu-152 >1 and <10, Eu-154 >1 and <10 *Comment*: This area has both metals and radionuclide ecological risk drivers. For the metals, As, Hg, and Ni caused slightly elevated potential risks to the environment. The source term and maximum concentrations for As were 3.0 and 5.9 mg/kg, respectively, which are close to the background average and UTL values of 4.46 and 5.8 mg/kg. The radionuclides Cs-137, Eu-152, and Eu-154 were in concentrations large enough to indicate appreciable risk from both internal and external exposures. Additionally, Sr-90 concentrations indicate a slight risk from internal exposure. WAG 3 must address Old Storage Pool Group As, Hg, Ni, Am-241, Cs-134, Cs-137, Eu-154, Sr-90 concentrations in its clean-up decision (i.e., monitoring, clean up, etc). These same contaminants need to be included in the OU 10-04 ERA.
Storage Yard Group	Yes	*COPCs:* Metals (As, Hg, Ni) and radionuclides *Contaminated Media:* Surface and subsurface soil *HQs*: As >1 and <10, Hg >1 and <100, Ni >1 and <10 *Comment:* In WAG ERA, radionuclides were < EBSLs or background concentrations. This area has potential ecological risk from metals contamination. As, Hg, and Ni concentrations cause a potential risk. The source term and maximum concentrations for As were 2.0 and 5.9 mg/kg, respectively, which are close to the background average and UTL values of 4.46 and 5.8 mg/kg. WAG 3 must address Storage Yard Group As, Hg, Ni concentrations in its clean-up decision (i.e., monitoring, clean-up, etc). These same contaminants need to be included in the OU 10-04 ERA.

in INEEL ERAs. This is an effort that will continue throughout the ERA process at the INEEL. Several contaminants (e.g., arsenic) appear to be an ecological risk at soil concentrations that are typical of background concentrations for these metals at similar sites. However, they fail the background screen at the INEEL. To permit more accurate assessment, these contaminants need to be reviewed at the OU 10-04 ERA.

C2-1-4. WAG 4 ERA

A modified SLERA for WAG 4 was performed using portions of the methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995). The WAG 4 screening identified those contaminants present that have the potential to cause undesirable ecological effects. Those sites identified in the FFA/CO (DOE-ID 1991) and any new sites were considered in the screening. Any site for which inadequate contaminant information was available to determine potential ecological effects was acknowledged. The WAG ERA in the WAG 4 RI/BRA will be conducted using the information developed from the WAG 4 screening. The WAG 4 ERA will be finalized and completed in FY-98.

C2-1-4.1 Summary of WAG 4 Site Screening

Sites identified in the FFA/CO (DOE-ID 1991) were eliminated from consideration in the WAG 4 screening if one or both of the following primary screening criteria were met:

1. The site is uncontaminated (no source)

2. There is no contaminant pathway to terrestrial ecological receptors.

Uncontaminated sites may include sites for which no historical record of disposition of hazardous material exists, remediated sites, and sites for which all sampling showed at or below background contaminant concentrations.

Several sites and/or contaminants were eliminated in the human health site screening through comparison to risk based concentration (RBC) values. Sites and/or levels eliminated in the human health screening based on RBCs that exceeded ecologically based screening levels are retained for evaluation in the WAG 4 ERA. Sites that were eliminated included sites for which no pathways to terrestrial receptors exist and include those where contaminants are contained and sealed (intact storage tanks) from biotic intrusion. Also a site was eliminated if the contaminated medium was greater than 10 ft below ground surface (VanHorn et al. 1995).

A data gap analysis was performed to determine whether WAG 4 sites of concern have been adequately characterized for all assessed contaminants. Past investigations (including Track 1 and Track 2 documentation) for the sites of concern were reviewed to determine need for additional sampling to evaluate the risk WAG 4 sites pose to ecological receptors. The analysis was based on the assumption that the sampling design applied for human health contaminant source and media identification was adequate/applicable for ecological characterization. Potential data gaps were evaluated and identified in three basic steps:

1. Contaminant sampling data for each site of concern were compiled from Track 1 and Track 2 investigations and Environmental Restoration Information System (ERIS) database contents. Sites for which no data or incomplete data have been collected (new sites and sites not fully characterized as identified in the human health data gaps analysis) were included as data gaps without further investigation.

2. Detection limits for each nonradiological contaminant were then compared to EBSLs. Contaminants for which detection levels exceeded EBSLs were identified as data gaps (except in cases, such as some metals, where EBSLs were lower than background levels). In

addition, any contaminant concentrations from Track 1 and/or Track 2 investigations which where extrapolated from one site to another for human health assessment were reinvestigated.

3. As a final step, data gaps other than those that can be filled by additional sampling of contaminated media were identified and summarized.

C2-1-4.2 WAG 4 Ecological Risk Assessment

Table C2-1-4-1 lists the sites (the unshaded sites) and their contaminants that must be included in the OU 10-04 ERA. These sites and contaminants will also be included in the WAG 4 ERA. No sampling data gaps were identified for 25 of the 37 sites of concern for ecological receptors. The *WAG 4 Comprehensive Work Plan* (McCormick 1997) discusses the sites targeted in the human health data gap analysis for more extensive sampling. EBSLs for all contaminants to be sampled at these sites should be incorporated to ensure detection limits are adequate for ecological receptors and both surface (0-6 in.) and subsurface (0.5-10 ft) intervals should be characterized.

A data gap inherent in using human health sampling data for the WAG ERA is the lack of characterization of biotic media for WAG sites of concern. Human health risk assessments do not incorporate detailed food web transfer mechanisms and scenarios, and biotic data are not routinely collected as part of the INEEL Track 1 and Track 2 processes. However, the approach to the ERA at the INEEL is focused on identification and evaluation of contamination issues at an INEEL-wide level. Biotic sampling will generally not be incorporated until preliminary risks to ecological receptors have been characterized for each WAG, OU 10-04 contaminants of concern are currently identified and evaluated, and sampling designs/monitoring programs that incorporate considerations for identifying and characterizing potential effects at both the individual and population levels for INEEL ecological receptors are developed.

Other information gaps for the ERA include obtaining data to refine model input values to reduce conservatism in exposure calculations (i.e., toxicity reference values, bioaccumulation factors, plant uptake factors, species home ranges, etc.), and the development of toxicity reference values (TRVs) for contaminants that have not been previously identified and evaluated.

C2-1-4.3 Status of WAG 4 Ecological Investigations

As of September 1997, WAG 4 has completed both the *Comprehensive Scope of Work* (McCormick and Rood 1996) and the *Work Plan* (McCormick 1997). The WAG 4 RI/BRA, which will include the WAG ERA, has been initiated and is scheduled for completion in FY-98.

Table C2-1-4-1. WAG 4 ERA results.

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-02	NA	*COPCs*: VOCs, SVOCs, PCBs, TPH, metals, and radionuclides
Site: CFA-13		*Contaminated Media*: Surface and subsurface soil
Dry Well (South by CFA-640)		*HQ:* NA
		Comment: This site was listed as a retained site, however it was not listed as a site of concern for the WAG ERA. Data collected during the non-time critical removal action will be used to assess risk to human health and the environment. Contaminants in SLERA had detection limits <EBSLs. Therefore, CFA-13 was not evaluated in the WAG ERA.
OU 4-03	Y	*COPC*: TPH
Site: CFA-21		*HQ*: TPH ≤ 1 to ≤ 10.
Fuel Tank at Nevada Circle 1 (South by CFA-629)		*Contaminated Media*: Subsurface soil.
		Comment: The WAG ERA showed that TPH was >EBSL and had an HQ >1. Therefore, CFA-21 and contaminant will be included in the OU 10-04 ERA.
OU 4-03	N	*COPCs*: VOCs, BTEX, TPH
Site: CFA-22		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-640		*Comment:* The WAG ERA showed that since contamination is > 3m below ground surface, CFA-22 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: xylene, TPH
Site: CFA-23		*HQ*: TPH < 1
Fuel Oil Tank at CFA-641		*Contaminated Media*: Subsurface soil
		Comment: The WAG ERA showed that xylene was < EBSL and TPH had an HQ < 1. Therefore,CFA-23 was eliminated as an ecological risk site.
OU 4-03	N	*COPC*: TPH
Site: CFA-24		*Contaminated Media*: Subsurface soil
Fuel Tank at Nevada Circle 2 (South by CFA-629)		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH had an HQ < 1. Therefore, CFA-24 was eliminated as an ecological risk site.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-03	N	*COPC*: TPH
Site: CFA-25		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-656 (north side)		*HQ:* NA
		Comment: The WAG ERA showed that TPH was < EBSL. Therefore, CFA-25 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH, toluene, ethylbenzene, toluene and xylene
Site: CFA-27		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-669		*HQ*: TPH < 1
		Comment: The WAG ERA showed that ethylbenzene, toluene and xylene were < EBSLs and that TPH had an HQ < 1. Therefore, CFA-27 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH
Site: CFA-28		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-674 (West)		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH had an HQ < 1. Therefore, CFA-28 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH
Site: CFA-29		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-664		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH had an HQ < 1. Therefore, CFA-29 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH and ethylbenzene
Site: CFA-30		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-665		*HQ*: TPH < 1
		Comment: The WAG ERA showed that ethylbenzene was < EBSL and the HQ for TPH was < 1. Therefore, CFA-30 was eliminated as an ecological risk site.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-03	Y	*COPCs*: TPH, ethylbenzene, toluene, and xylene
Site: CFA-31		*Contaminated Media*: Subsurface soil
Waste Oil Tank at CFA-754		*HQ*: TPH ≤ 1 to ≤ 7
		Comment: The WAG ERA showed that ethylbenzene and toluene were < EBSLs and xylene had an HQ < 1 but TPH had an HQ ≤ 1 to ≤ 7. Therefore, CFA-31 and contaminant will be included in the OU 10-04 ERA.
OU 4-03	N	*COPCs*: TPH
Site: CFA-32		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-667 (North)		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH was < EBSL. Therefore, CFA-32 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH
Site: CFA-34		*Contaminated Media*: Subsurface soil
Diesel Tank at CFA-681 (South)		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH was > EBSL but had an HQ < 1. Therefore, CFA-34 was eliminated as an ecological risk site
OU 4-03	NA	*COPCs*: Metals and sulfuric acid
Site: CFA-35		*Contaminated Media*: Subsurface soil
Sulfuric Acid Tank at CFA-674 (West)		*Comment:* The WAG ERA showed that all metals were < EBSLs. Therefore, CFA-35 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH
Site: CFA-37		*Contaminated Media*: Subsurface soil
Diesel Tank at CFA-681 (South)		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH was > EBSL but had an HQ < 1. Therefore, CFA-37 was eliminated as an ecological risk site.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-03	N	*COPCs*: TPH
Site: CFA-38		*Contaminated Media*: Subsurface soil
Fuel Oil Tank at CFA-683		*HQ*: TPH < 1
		Comment: The WAG ERA showed that TPH was > EBSL but had an HQ < 1. Therefore, CFA-38 was eliminated as an ecological risk site.
OU 4-03	N	*COPCs*: TPH
Site: CFA-45		*Contaminated Media*: Subsurface soil
Fuel Oil Tank (CFA-605W)		*HQ:* TPH < 1
		Comment: The WAG ERA showed that TPH was > EBSL but contamination was > 3m below ground surface. Therefore, CFA-45 was eliminated as an ecological risk site.
OU 4-04	Y	*COPCs*: TPH
Site: CFA-40		*Contaminated Media*: Subsurface soil
Returnable Drum Storage – South of CFA-601		*HQ*: TPH < 1 to 3
		Comment: The WAG ERA showed that TPH was > EBSL and had an HQ < 1 to 3. Therefore, CFA-40 and contaminant will be included in the OU 10-04 ERA.
OU 4-04	Y	*COPCs*: TPH and xylene
Site: CFA-41		*Contaminated Media*: Subsurface soil
Excess Drum Storage (South of CFA-674)		*HQ:* < 1 to 20
		Comment: The WAG ERA showed that TPH was > EBSL and had an HQ < 1 to 20. Therefore, CFA-41 and contaminant will be included in the OU 10-04 ERA.
OU 4-05	Y	*COPCs*: Organic compounds, metals and nitrate
Site: CFA-04		*Contaminated Media*: Surface and subsurface soil
Pond Near CFA-674		*HQ*: Al ≤ 1 to 4,000, As ≤ 1 to 10, Ba ≤ 2 to 10,000, Cd ≤ 2 to 3,000, Cr^{+3} < 1 to 5, Cr^{+6} ≤ 1 to 200, Cu ≤ 1 to 200, Pb ≤ 1 to 90, Hg < 1 to 30,000, Ni < 1 to 100, Ag < 1 to 20, nitrate ≤ 1 to 2, Aroclor-1254 < 1
		Comment: The WAG ERA showed that Aroclor-1254, nitrate and several metals were > EBSLs. Metals (Al, As, Ba, Cd, Cr^{+3}, Cr^{+6}, Cu, Pb, Hg, Ni, and Ag) and nitrates had HQs >1. Therefore, CFA-04 and contaminants were included in the OU 10-04 ERA.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-05	Y	*COPCs*: Organic compounds and metals
Site: CFA-17/47		*Contaminated Media*: Surface and subsurface soil
Fire Department Training Area, bermed and Chemical Disposal[a]		*HQ*: benzo(g,h,i)perylene < 1 and xylene < 1 to 10
		Comment: The WAG ERA showed that several metals and organic compounds were > EBSLs and only xylene had an HQ > 1. Therefore, CFA-17/47 and xylene were included in the OU 10-04 ERA.
OU 4-05	NA	*COPCs*: Metals (Al, Ca, Pb, Se)
Site: CFA-50		*Contaminated Media*: Subsurface soil
Shallow Well East of CFA-654		*Comment:* The WAG ERA showed that Al and Ca were eliminated from human health risk assessment and Pb and Se had HQs < 1. Therefore, CFA-50 was eliminated as an ecological risk site.
OU 4-06	Y	*COPCs*: As and Pb
Site: CFA-06		*Contaminated Media*: Surface soil
Pb shop (outside area)		*HQ*: As ≤ 1 to 10, Pb ≤ 1 to 200
		Comment: The WAG ERA showed that As and Pb were > EBSLs and had HQs > 1. Therefore, CFA-06 and contaminants will be included in the OU 10-04 ERA.
OU 4-06	Y	*COPCs*: Pb
Site: CFA-43		*Contaminated Media*: Surface soil
Pb Storage Area		*HQ*: Pb ≤ 1 to 300
		Comment: The WAG ERA showed that Pb was > EBSL and had an HQ > 1. Therefore, CFA-43 and its contaminant will be included in the OU 10-04 ERA.
OU 4-06	Y	*COPCs*: Pb
Site: CFA-44		*Contaminated Media*: No sample data are available
Spray Paint Booth Drain (CFA-654)		HQ: Pb ≤ 1 to 3
		Comment: The WAG ERA showed that Pb was > EBSL and had an HQ > 1. Therefore, CFA-44 and its contaminant will be included in the OU 10-04 ERA.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-07	N	*COPCs*: Radionuclides and organic compounds
Site: CFA-12		*Contaminated Media*: Subsurface soil
Two French Drains (CFA-654)		*HQ*: pentachlorophenol < 1
		Comment: The WAG ERA showed that all radionuclides and most organic compounds were <EBSLs, but pentachlorophenol was > EBSL, but had an HQ < 1. Therefore, CFA-12 was eliminated as an ecological risk site.
OU 4-07	Y	*COPCs*: Metals (Pb, Hg, and Ag)
Site: CFA-48		*Contaminated Media*: Surface soil
Chemical Washout Area South of CFA-633		*HQ*: Pb ≤ 1 to 4
		Comment: The WAG ERA showed that Pb, Hg, and Ag were > EBSLs, Hg and Ag had HQs < 1 but Pb had an HQ > 1. Therefore, CFA-48 and its contaminant will be included in the OU 10-04 ERA.
OU 4-08	Y	*COPCs*: Metals (As, Ba, Cr^{+3}, Cr^{+6}, Cu, Hg, Se, Ag) and organic compounds (Aroclor-1254, benzo(a)pyrene, chloromethane)
Site: CFA-08		*Contaminated Media*: Surface and subsurface soil
Sewage Plant (CFA-691), Septic Tank (CFA-716), and Drainfield		*HQ*: As ≤ 1 to 10, Ba < 1 to 4,000, Cr^{+3} < 1 to 2, Cr^{+6} ≤ 1 to 40, Cu ≤ 1 to 10, Hg ≤ 1 to 30, Se ≤ 2 to 20, Ag ≤ 3 to 5
		Comment: The WAG ERA showed that several metals were > EBSLs, As, Ba, Cr^{+3}, Cr^{+6}, Cu, Hg, Se, Ag had HQs > 1. Aroclor-1254 and benzo(a)pyrene had HQs < 1 and there is no HQ for chlormethane. Therefore, CFA-08 and its contaminants will be included in the OU 10-04 ERA.
OU 4-08	N	*COPCs*: Radionuclides (Co-60 and Ra-226)
Site: CFA-49		*Contaminated Media*: Surface and subsurface soil
Hot Laundry Drain Pipe		*Comment:* The WAG ERA showed that radionuclides were < EBSLs. Therefore, CFA-49 was eliminated as an ecological risk site.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-09	Y	*COPCs*: Metals (Sb, As, Cd, Cr^{+3}, Cr^{+6}, Cu, Pb, Hg, Ni, Zn) and PCBs
Site: CFA-10		*Contaminated Media*: Surface soil
Transformer Yard Oil Spills		*HQ*: Sb < 1 to 4, As < 1 to 8, Cd ≤ 1 to 2,000, Cr^{+6} < 1 to 30, Cu < to 70, Pb < 1 to 3,000, Hg < 1 to 4, Ni < 1 to 20, and Zn < 1 to 70.
		Comment: The WAG ERA showed that Sb, As, Cd, Cr^{+6}, Cu, Pb, Hg, Ni and Zn had HQs > 1. Therefore, CFA-10 and its contaminants will be included in the OU 10-04 ERA.
OU 4-09	Y	*COPCs*: TPH
Site: CFA-26		*Contaminated Media*: Subsurface soil
CFA-760 Pump Station Fuel Spill		*HQ*: TPH ≤ 1 to 4
		Comment: The WAG ERA showed that TPH was > EBSL and had an HQ > 1. Therefore, CFA-26 and its contaminant will be included in the OU 10-04 ERA.
OU 4-09	N	*COPCs*: Organic compounds
Site: CFA-42		*Contaminated Media*: Subsurface soil
Tank Farm Pump Station Spills		*HQ:* NA
		Comment: The WAG ERA showed that several organic compounds were < EBSLs. Therefore, CFA-26 was eliminated as an ecological risk site.
OU 4-11	Y	*COPCs*: Metals (As, Cd, Cr^{+3}, Cu, Pb, and Hg) and organic compounds
Site: CFA-05		*Contaminated Media*: Surface and subsurface soil
CFA Motor Pool Pond		*HQ*: As ≤ 1 to 20, Cd ≤ 1 to 10,000, Cr^{+3} ≤ 1 to 1,000, Cu ≤ 1 to 100, Pb ≤ 1 to 1,000, and Hg ≤ 1 to 80.
		Comment: The WAG ERA showed that several metals and organic compounds were > EBSLs. As, Cd, Cr^{+3}, Cu, Pb, and Hg had HQs > 1. Therefore, CFA-05 and its contaminants will be included in the OU 10-04 ERA.

Table C2-1-4-1. (continued).

Operable Unit/Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 4-12	Y	*COPCs*: Organic compounds, metals, and asbestos
Site: CFA-01		*Contaminated Media*: Surface and subsurface soil
Landfill I		*HQ:* No appropriate data are available
		Comment: The WAG ERA indicated that miscellaneous wastes possibly containing organic compounds, metals, and asbestos were initially identified. Only water data are available. Therefore, CFA-01 and its contaminants will be included in the OU 10-04 ERA.
OU 4-12	Y	*COPCs*: Organic compounds and Hg
Site: CFA-02		*Contaminated Media*: Surface and subsurface soil
Landfill II		*HQ*: Hg ≤ 1 to 5, acetone ≤ 1 to 20, benzo(a)pyrene < 1, benzo(b)fluoranthene ≤ 1, benzo(g,h,i)perylene < 1, benzo(k)fluoranthene < 2, chrysene < 1, dibenz(a,h)anthracene < 1, indeno (1,2,3-cd)pyrene < 1
		Comment: The WAG ERA showed that several organic compounds and metals were > EBSLs. Hg, acetone and benzo(k)fluoranthene had HQs > 1. Other organic compounds had HQs < 1 except no HQs are available for 2-hexanone, 2-methylnaphthalene, 2-methyl-4-pentanone, dibenzofuran and pentachlorophenol. Therefore, CFA-02 and its contaminants will be included in the OU 10-04 ERA.
OU 4-12	N	*COPCs*: Organic compounds and metals
Site: CFA-03		*Contaminated Media*: Surface and subsurface soil
Landfill III		*Comment:* The WAG ERA showed that several organic compounds and metals were < EBSLs. Therefore, CFA-03 was eliminated as an ecological risk site.

a. CFA-17 and CFA-47 were evaluated in the WAG ERA as one site.

C2-1-5. WAG 5 DATA GAPS

A modified SLERA was conducted for WAG 5 using the methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995). The WAG 5 screening identified those contaminants present that have the potential to cause undesirable ecological effects. The WAG ERA will be conducted in the WAG 5 RI/BRA using the information developed from the WAG 5 screening. The WAG 5 ERA will be finalized in FY-98.

C2-1-5.1 Summary of WAG 5 Site Screening

The WAG 5 FFA/CO sites were initially screened, followed by a data gap analysis that evaluated existing human health contaminant sampling data to identify sites and contaminants for which characterization is inadequate for a WAG 5 ERA. Sites identified in the FFA/CO (DOE-ID 1991) were eliminated from consideration in the WAG 5 ERA if one or both of the following primary screening criteria were met:

1. The site is uncontaminated (no source)

2. There is no contaminant pathway to terrestrial ecological receptors

Uncontaminated sites included sites with no historical record of deposition of hazardous material and sites for which all sampling showed at or below background contaminant concentration. Several sites were eliminated in the human health site screening through comparison to risk-based concentrations values. Sites and contaminants eliminated in the human health screening based on risk-based concentrations that exceeded ecologically based screening concentrations were retained for investigation in the WAG 5 ERA. PBF-16 was retained as a result of this evaluation because residual mercury contamination is 0.1 mg/kg.

Sites with no pathways to terrestrial ecological receptors included those with contaminants contained and sealed from biotic intrusion (intact tanks), or those with a contaminated medium greater than 3 m (10 ft) below ground surface (Van Horn et al. 1994). Pathways and exposure routes identified for WAG 5 contaminated media were discussed in the *WAG 5 Comprehensive Work Plan* (Webber 1997). A data gap analysis for WAG 5 ecological sites of concern was then performed to determine if WAG 5 ecological sites of concern have been adequately characterized for all expected contaminants. Past investigations for WAG 5 sites of concern were reviewed to determine the need for additional sampling to evaluate the risk WAG 5 sites pose to ecological receptors. The review incorporated results of a corresponding site screening conducted for the WAG 5 human health investigation, as well as a comparison of contaminant sample detection limits to ecologically based screening concentrations for each contaminated medium (VanHorn et al. 1995).

The analysis was based on the assumption that the sampling design applied for human health contaminant source and media identification was adequate/applicable for ecological characterization. It should be noted that detection limits for some contaminants that were eliminated based on human health criteria were higher than the calculated EBSL for that contaminant. In these cases, contaminant concentration data were inconclusive and represent data gaps for the ERA (WAG SLERA and the OU 10-04 ERA). The data gap analysis focused primarily on detection limits associated with soil sampling data for nonradiological contaminants at depths above 3 m (10 ft) (INEEL ERA, contaminants below 3 m [10 ft] are assumed to be inaccessible to ecological receptors [VanHorn et al. 1995]). Detection limits for human health sampling of radionuclides are adequately protective of ecological

receptors and were not investigated as part of this analysis. Sites for which wastewater, water, and sediment data were collected were retained for further evaluation in the WAG 5 ERA, because evaluation of water and sediment toxicity is too detailed for inclusion in this screening. Detection limits were compared to the lowest calculated EBSL for a given COPC (across all functional groups) to ensure all potential data gaps were identified.

C2-1-5.2 WAG 5 Ecological Risk Assessment

The WAG 5 sites of concern that required incorporation in the OU 10-04 ERA are identified in Table C2-1-5-1. No sampling data gaps were identified for seven of the 15 sites (ARA-03, ARA-06, ARA-12, PBF-04, PBF-16, and PBF-21). Six sites were targeted in the human health data gap analysis for more extensive sampling (ARA-01, ARA-02, ARA-10, ARA-16, ARA-23 and ARA-24). The EBSLs for all contaminants to be samples at these sites should be incorporated to ensure detection limits are adequate for ecological receptors and both surface (0 to 15 cm [0 to 6 in.]) and subsurface (0.15 to 3 m [0.5 to 10 ft]) intervals should be characterized.

Five sites (ARA-01, ARA-02, ARA-12, PBF-22, and PBF-26) were found to have sampling detection limits for Aroclor (-1016, -1221, -1232, -1242, -1248, -1254, -1260) that were higher than calculated PCBs EBSLs. ARA-02 and ARA-12 data show detection limits for other organics that were higher than calculated EBSLs for those contaminants (see *WAG 5, OU 5-12, Work Plan* [Webber 1997] for additional details).

A data gap inherent in using human health sampling data for the ERA is the lack of characterization of biotic media for WAG sites of concern. Human health risk assessments do not incorporate detailed food web transfer mechanisms and scenarios, and biotic data are not routinely collected as part of the INEEL WAG processes. However, the INEEL approach to ERA focuses on identifying and evaluating preliminary risks to ecological receptors.

C2-1-5.3 Status of WAG 5 Ecological Investigations

As of September 1997, WAG 5 has completed both the *Comprehensive Scope of Work* (Hiaring 1997) and the *Work Plan* (Webber 1997). The RI/BRA for WAG 5 has been initiated and is scheduled for completion in FY-98.

Table C2-1-5-1. WAG 5 ERA results.[a]

Operable Unit	Site	Description	Comment
ARA-I			
5-10	**ARA-01**	**Chemical/evaporation pond (ARA-745)**	**The COPCs include inorganics in surface and subsurface soil. Potential risk applies to terrestrial receptors from exposure to antimony, arsenic, lead, selenium, silver, thallium, and vanadium.**
5-07	**ARA-02**	**Septic tank soils and seepage pit (ARA-746)**	**The COPCs include both organics and inorganics in surface and subsurface soil. Potential risk applies to terrestrial receptors from exposure to acetone, arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc. COPCs were detected in the seepage pit at depths of 8 to 10 ft. Three inorganics, cobalt, copper, and magnesium, pose potential risks at the leach pit.**
5-07	ARA-03	Pad near ARA-627 (lead sheeting)	Arsenic is the COPC in surface and shallow subsurface soil. HQs are < 1 for all receptors; therefore, there is no expected risk to terrestrial receptors from exposure to arsenic.
—	ARA-04	Sewage Treatment Facility (ARA-737)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997) because it received only sanitary waste. There was no evidence of hazardous waste, and no contaminant source was found.
5-01	ARA-05	Evaporation pond to NE (ARA-744)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). No waste was generated or disposed of at the site. It received parking lot runoff only.
5-01	ARA-16	Radionuclide tank (ARA-729)	Fluoride is the COPC in surface soil. HQs are < 1 for all receptors; therefore, there is no expected risk to terrestrial receptors from exposure to fluoride.
5-01	ARA-17	Drain (ARA-626)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither history of hazardous waste being disposed of in the drain nor a contaminant source.
ARA-II			
5-05	ARA-06	SL-1 burial ground	The site has been capped. The pathway has been eliminated.
—	ARA-07	Seepage pit to east (ARA-720A)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste entering this system nor a contaminant source.
—	ARA-08	Seepage pit to west (ARA-720B)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste entering this system nor a contaminant source.

Table C2-1-5-1. (continued).

Operable Unit	Site	Description	Comment
—	ARA-09	Septic tank (ARA-738)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The site received only sanitary waste. There was neither evidence of hazardous waste nor a contaminant source.
—	ARA-10	Septic tank east (ARA-613)	The site was eliminated in ecologically based screening level (EBSL) screening.
—	ARA-11	Septic tank west (ARA-606)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The site received only sanitary waste. There was neither evidence of hazardous waste nor a contaminant source.
5-01	ARA-19	Detention tank for fuel oil/radionuclides (ARA-719)	The tank was removed and residual soils will be assessed under OU 5-12, ARA-23.
5-12	ARA-23	Radiologically contaminated surface soils around ARA I and II	The site was eliminated in EBSL screening.
ARA-III			
5-06	**ARA-12**	**Radioactive waste leach pond**	**The COPCs include metals and benzo(a)pyrene in surface and subsurface soil. HQs were < 1 for benzo(a)pyrene and silver. Potential risk applies to terrestrial receptors from exposure to cadmium, chromium, mercury, selenium, and zinc. HQs for cadmium were as high as 2,000.**
5-11	ARA-13	Sanitary sewer leach field and septic tank (ARA-740)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). Soil sampling indicated no contamination above background. There was no contaminant source.
—	ARA-14	Septic tank and drain field (ARA-739)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of the site receiving hazardous waste nor a contaminant source.
5-01	ARA-15	Radionuclide tank (ARA-735)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The tank and any contaminated soil were removed. There was no contaminant source.
5-01	ARA-18	Radionuclide tank (ARA-736)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The tank and any contaminated soil were removed. There was no contaminant source.
5-12	ARA-24	ARA-111 windblown soils	The site was eliminated in EBSL screening.

Table C2-1-5-1. (continued).

Operable Unit	Site	Description	Comment
ARA-IV			
5-06	ARA-20	Test Area contaminated leach Pit 1	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The pit was cleaned up to below acceptable risk-based levels as part of a 1987 D&D effort. There was neither a contaminant pathway nor source.
—	ARA-21	Test Area septic tank and leach Pit 2	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of the site receiving hazardous waste nor a contaminant source.
—	ARA-22	Control area septic tank and leach Pit 3 (ARA-617)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither a record of this site receiving hazardous constituents nor a contaminant source.
PBF Control Area			
—	PBF-01	Control area septic tank (PBF-724), seepage pit (PBF-735)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence that this site received hazardous constituents nor a contaminant source.
—	PBF-02	Control area septic tanks (PBF-738, 739), seepage pit (PBF-736)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of receiving hazardous constituents nor a contaminant source.
—	PBF-03	Control area septic tank for PBF-632 and seepage pits (PBF-745, 748)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence that this site received hazardous waste nor a contaminant source.
5-04	PBF-04	Control area oil tank at PBF-608 (substation) outside PBF fence	Xylene is the COPC in surface soil at this very small site (11 m^2). HQs are < 1 for all mammalian receptors; therefore, there is no expected risk to terrestrial receptors from exposure to xylene. Risks to birds, reptiles, and plants could not be evaluated..
5-12	PBF-32	Fuel oil tank (PBF-742)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). All remaining contamination was at basalt bedrock greater than 3 m (10 ft) bls. There was no contaminant pathway.
PBF Reactor Area (SPERT-I)			
5-08	PBF-05	Warm waste injection well (PBF-301)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The well has a steel casement to 33.5 m (110 ft) depth. No pathway.

Table C2-1-5-1. (continued).

Operable Unit	Site	Description	Comment
5-03	PBF-06	Blowdown pit for reactor boiler by PBF-621	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous contaminants entering the ditch nor a contaminant source.
5-03	PBF-07	Oil drum storage (PER-T13)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither a contaminant source nor a pathway.
5-13	PBF-08	Corrosive waste disposal sump brine tank (PBF-731)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). An unlined concrete sump extending 5.5 m (18 ft) below ground surface. There was no contaminant pathway.
—	PBF-09	Septic tank and drain field (PBF-728)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence that this site received hazardous waste nor a contaminant source.
5-13	PBF-10	Evaporation pond (PBF-733)	Chromium is the COPC in surface soil. Based on dose predictions and HQ calculations, there is a potential for risk to terrestrial receptors from exposure to chromium in soil at this site. HQs for chromium ranged from 1 to 400. Because few positive habitat features are associated with this site, it may generally be discounted as contributing significantly to chronic COPC exposures for ecological receptors.
5-08	PBF-11	Seepage pit (PBF-750)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was no contaminant source.
5-02	PBF-12	Leach pond	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The site was remediated. There was no contaminant source.
5-03	PBF-13	Rubble pit	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). This site contained construction debris only. The area was cleaned up and backfilled. There was no contaminant source.
5-08	PBF-15	Corrosive waste injection well (PBF-302)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was no contaminant pathway.
5-03	PBF-28	Cooling tower area and drainage ditch	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). This site received cooling tower effluent only. There was no contaminant source.
5-12	PBF-30	Abandoned septic system	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was no evidence of hazardous constituents disposed of to this system. There was no contaminant source.

Table C2-1-5-1. (continued).

Operable Unit	Site	Description	Comment
PBF-WEDF (SPERT-II)			
5-04	PBF-14	Inactive fuel oil tank (front of PBF-612)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). The site was remediated. There was no contaminant source.
5-09	PBF-16	Leach pond	COPCs include lead and mercury in soil.
—	PBF-17	Septic tank and seepage pit (PBF-725)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste nor a contaminant source.
5-12	PBF-31	Fuel oil tank (PBF-732)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). All remaining contamination was at basalt bedrock at a depth greater than 3 m (10 ft) bls. There was no contaminant pathway.
PBF-WERF (SPERT-III)			
5-04	PBF-19	Inactive fuel oil tank at PBF-609 (west side of WERF)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). Contaminated soil was removed when the tank was removed in 1986 and the area was paved over. There was neither a contaminant source nor a pathway.
5-09	PBF-20	Small leach pond	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was no contaminant source.
5-02	PBF-21	Large leach pond	COPCs are cobalt and selenium in subsurface soil (5-8'). HQs are between 1 and 5 for cobalt, HQs are < 2 for copper. Risks considered very low because of the depth of the contamination and exposure concentration barely exceeds background.
—	PBF-27	Septic tank (PBF-726) and seepage pit	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste nor a contaminant source.
PBF-MWSF (SPERT-IV)			
5-09	PBF-22	Leach pond (PBF-758)	The COPCs are Aroclors and metals in surface and subsurface soils. The potential for risk occurs from terrestrial receptors' exposure to cadmium, chromium, cobalt, copper, manganese, mercury, and selenium. HQs were ≤ 1 for Aroclor-1254 and silver, indicating a low likelihood of risk from exposure to the chemical.

Table C2-1-5-1. (continued).

Operable Unit	Site	Description	Comment
5-03	PBF-24	Blowdown pit (adjacent to PBF-716)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste nor a contaminant source.
—	PBF-25	Septic tank and leach pit (PBF-727 and 757)	The site was eliminated in ecological site screening and data gap identification in the WAG 5 Work Plan (Webber 1997). There was neither evidence of hazardous waste nor a contaminant source.
5-02	PBF-26	Lake (adjacent to PBF-758)	The COPCs are Aroclor-1254 and metals in surface soil. The potential for risk to terrestrial receptors occurs from exposure to Aroclor-1254, chromium, copper, lead, mercury, nickel, silver, and zinc.

C2-1-6. WAG 7 ERA

C2-1-6.1 Summary of WAG 7 Site Screening

An Ecological Health Contaminant Screening Analysis was used as the screening level analysis for WAG 7. The objective of this screening analysis was to determine which of the more than 200 contaminants buried at the Subsurface Disposal Area (SDA) have potential to cause adverse effects to ecological components and as such may be carried forward for evaluation in the SDA pits and trenches ERA. The methodology used in this screening analysis is based on the *Guidance Manual for Conducting Screening Level Risk Assessments at the INEL* (VanHorn et al. 1995). It uses the basic exposure assessment and effects assessment methodology that a SLERA would, but does not contain any of the detailed information generally presented as part of the problem formulation. This approach was developed specifically for this screening process. It should be noted, however, that as of September 28, 1997, the *WAG 7 Comprehensive Scope of Work* (Huntley and Burns 1995) is being revised to include the Pit 9 Operable Unit. This also means the *Work Plan* (Becker et al. 1996) which contained the SLERA will also be revised, and therefore the content of the WAG 7 screening will be re-evaluated.

Figure C2-1-6-1 is a flow chart of the screening methodology used in this analysis. The flow chart includes analysis methodologies for each of three major types of contaminants disposed of in the SDA; organics, inorganics, and radionuclides. The methodology includes two basic screening comparisons for each type of contaminant: (1) Concentrations of contaminants detected at the SDA were compared against background concentrations, and (2) conservative calculations were performed for each contaminant to determine if a given contaminant's calculated hazard quotient is expected to exceed target values.

Based on these screening steps, the SDA's contaminants were divided into two lists. If a given contaminant failed the screening steps mentioned above, the contaminant was placed on a "preliminary retention list". Likewise, if a given contaminant passed all of the screening steps, it was placed on a "preliminary elimination list." These lists contain the preliminary breakdown of the contaminants. The intent is that most of the contaminants on the retention list would be considered COPCs in the BRA, while most of the contaminants on the elimination list would be dropped from further consideration in the BRA.

Thus, a given contaminant must pass all of the screening steps to be placed in the elimination list, and it only has to fail one of the screening steps to be placed on the retention list. Using a serial process to develop the elimination list is a conservative method. It ensures that only those contaminants that do not warrant further analysis will be placed on the elimination list and dropped from consideration in the BRA.

After the elimination and retention lists were compiled, they were reviewed from a professional judgement perspective to determine if all contaminants seemed to have been placed on the appropriate list.

C2-1-6.2 WAG 7 Ecological Risk Assessment

Table C2-1-6-1 lists the contaminants of concern that require evaluation in the OU 10-04 ERA. During the data gap evaluation additional data gaps were identified. It became evident that several preliminary tasks must be performed before completing the baseline ERA problem formulation. First, the air pathways will need to be preassessed, the assessment area specifically defined, and detailed food

Table C2-1-6-1. WAG 7 ERA results.[a]

Contaminants of Concern

Retained Radionuclide Contaminants of Concern:[b]

Am-241	Po-212
Ba-137m	Po-216
Be-10	Po-218
Bi-214	Pr-144
C-14	Pu-238
Ce-144	Pu-239
m-244	Pu-240
Co-58	Pu-241
Co-60	Ra-224
Cs-134	Ra-226
Cs-137	Rn-220
Eu-152	Rn-222
Eu-154	Sb-125
Eu-155	Sr-90
H-3	Ta-182
I-129	Tc-99
Mn-54	Th-228
Na-22	U-232
Nb-94	U-234
Nb-95	U-238
Ni-63	Y-90
Np-237	Zn-65
Pa-234m	Zr-95
Pb-214	

Retained Nonradionuclide Contaminants of Concern:[b]

1,1,1-Trichloroethane	Organic acids
1,1,2-Trichloro-1,2,2-trifluoroethane	Organophosphates
1,4-bis(5-phenyloxazol-2-yl)benzene	PCBs
3-methyl-cholanthrene	Potassium chloride
Acetone	Potassium hydroxide
Aluminum nitrate	Potassium nitrate
Ammonia	Potassium phosphate
Aqua regia	Potassium sulfate
Asbestos	Sodium chloride
Benzene	Sodium cyanide
Beryllium	Sodium hydroxide
Cadmium	Sodium nitrate
Carbon tetrachloride	Sodium phosphate
Chloroform	Sodium-potassium
Chromium	Sulfuric acid
Cyanide	Terphenyl
Dibutylethylcarbutol	Tetrachloroethylene
Diisopropylfluorophosphate	Toluene
Diphenyl	Trichloroethylene
Ethyl alcohol	Trimethylolpropane-triester
Formaldehyde	Uranyl nitrate
Hydrazine	Versenes
Hydrofluoric acid	Zirconium
Lead	Total copper[c]
Magnesium	Total fluoride[d]

Table C2-1-6-1. (continued).

Contaminants of Concern	
Manganese	Total nitrate[e]
Methyl isobutyl ketone	Total phosphate[f]
Methylene chloride	Total sulfate[g]
Nickel	Mercury[h]
Nitric acid	Uranium[i]
Nitrocellulose	

a. Instead of a SLERA, WAG 7 conducted an Ecological Health Contaminant Screening Analysis for the entire SDA which considers contaminants from all OUs.

b. An original list of over 200 contaminants obtained encompassing all WAG 7 OUs has been reduced through the EHCSA to 47 radionuclides and 61 nonradionuclides.

c. Total from copper and copper nitrate

d. Total from hydrofluoric acid and magnesium fluoride

e. Total from aluminum nitrate, ammonia, copper nitrate, mercury nitrate monohydrate, nitric acid, potassium nitrate, sodium nitrate, and uranyl nitrate.

f. Total from potassium phosphate, sodium phosphate, and tributyl phosphate.

g. Total from potassium sulfate, sodium sulfate, and sulfuric acid

h. Total from mercury nitrate monohydrate

i. Total from uranyl nitrate and uranium radioisotopes

web models developed. A review of SDA-specific biotic data compiled as part of the human health transport modeling effort will be completed and pertinent data will be incorporated into the assessment. More complete characterization of SDA ecological components (i.e., threatened and/or endangered species currently present) will also be required for the ERA analysis.

To perform the actual analysis for the baseline ERA for the SDA, the development of detailed exposure models will be completed. A focused literature search will be performed to identify more realistic bioaccumulation factors, plant uptake factors, and functional group input values if possible. The toxicity benchmarks used will be revised to provide a less conservative approach than that used for the screening method. The appropriate method for applying the concentration terms provided by the human health transport programs (i.e., DOSOTMAN) to ERA will be determined.

The detail incorporated into the final risk characterization step depends on the amount and quality of the information disclosed by the literature search performed as part of the analysis. Developing a detailed approach for interpretation and presentation based on a weight of evidence approach recommended by the EPA (1992) is required before completing the ERA risk characterization step.

Preliminary results of a parameter sensitivity study for exposure models used in the preliminary screening indicate that TRVs, plant uptake factors (PUFs), and bioaccumulation factors have the greatest influence on calculated screening quotients for most receptors. Highly conservative values for these parameters were developed for the preliminary screening assessment, and since similar models will be applied in the ERA, less conservative, site-related values for these and other model parameters have been identified as the following data gaps for the assessment:

- Toxicity reference values
- Plant uptake factors
- Bioaccumulation factors
- Receptor exposure duration
- Site use factor
- Receptor ingestion rates
- Site-specific receptor diet
- Contaminant concentrations in media

Two additional data gaps not associated with individual parameter quantification include:

- Requirements for inhalation and dermal exposure assessment
- Definition of ecological scenarios for buried waste.

C2-1-6.3 Status of WAG 7 Ecological Investigations

As mentioned briefly above, WAG 7 had completed both a Comprehensive Scope of Work and a Comprehensive Work Plan. They also conducted an Intermittent Baseline Risk Assessment. More recently however, it was decided to include Pit 9 into the WAG 7 Comprehensive Investigation. This required drafting another Scope of Work, which includes Pit 9. This document is currently being reviewed and reworked per agency comments. The new WAG 7 comprehensive scope of work is scheduled to be final on September 30. The need, extent, and timeframe for conducting the WAG 7 ERA will be outlined in the revised WAG 7 Comprehensive Work Plan scheduled for completion in FY-98.

C2-1-7. WAG 8 ERA

The assessment of ecological impacts due to sources at WAG 8 consisted of two parts: the SLERA and the ERA. Both are included in the *Comprehensive RI/FS for WAG 8* (NRF 1997). Existing data and a representative set of birds and mammals were selected for evaluation in the SLERA. Because a literature search for WAG 8 did not produce definitive risk values for identified receptors that would allow for a meaningful quantification of risk, no attempt was made to quantify the risk to ecological receptors.

C2-1-7.1 Results of WAG 8 Site Screening

The objectives of the ERA for WAG 8 were to build on the results of the SLERA and define ecological receptors, contaminants of ecological concern, and areas that present a potential for ecological risk from sources at WAG 8. This was a qualitative assessment. The literature search performed during the WAG 8 Comprehensive RI/FS did not produce definitive risk values for the identified receptors that would allow a meaningful quantification of the ecological risk. Therefore, no attempt was made to quantify the risk to ecological receptors. The ERA identified several associated uncertainties but the results indicated that no additional actions are required due to estimated risks to ecological receptors.

Table C2-1-7-1 identifies the WAG 8 sites of concern and the associated contaminants that need to be considered for the OU 10-04 ERA. The SLERA identified exposure to heavy metals for lead, mercury, and arsenic as the primary ecological concern and reduced the list of receptors of concern to deer mice, bald eagles, and mallards. Additionally, the SLERA identified the NRF Sewage Lagoon (OU 8-03-23) as the area with the largest potential for impact to ecological receptors.

The SLERA assessed the impact to six categories of receptors due to all known stressors at WAG 8. The SLERA screened out all but three of the stressors—arsenic, lead, and mercury were retained. The ERA assessed the effects of these three stressors on the three receptors that were identified in the SLERA as representative of the INEEL ecological ecosystem. Exposure values for arsenic, lead, and mercury were calculated and compared to a range of NOAELs identified in a literature search. The weighted average concentration for each of these constituents at WAG 8 was also compared to background levels. The risks associated with the exposures to the ecological receptors are characterized as low. Although there are uncertainties associated with this assessment, the results indicate that no additional actions are required due to estimated risks to ecological concerns. However, the non-radionuclide contaminants at WAG 8 that have concentrations above an HQ of 1 and the radionuclide contaminants with an HQ >.01 will need to be included in the OU 10-04 ERA.

C2-1-7.2 Status of WAG 8 Ecological Investigations

WAG 8 completed its comprehensive RI/FS in FY-97, issued a comprehensive proposed plan in January 1998 and a draft ROD in May 1998. The sites and contaminants of concern obtained from the WAG 8 ecological investigation will be reviewed for incorporation into the OU 10-04 ERA.

Table C2-1-7-1. WAG 8 ERA results.

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-02-09	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn)
		Contaminated Media: Surface soil
Parking Lot Trenches		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS.
OU 8-03-10	Yes	*COPCs*: Metals (As, Ba, Cr, Pb, and Hg)
		Contaminated Media: Surface soil
Sand Blasting Slag Trench		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba and Cr were screened from further assessment as discussed in the WAG 8 RI/FS.
OU 8-03-15	Yes	*COPCs*: Pb
		Contaminated Media: Surface soil
S1W Acid Spill		*HQs:* N/A[a]
		Comment: The inclusion of Pb as a COPC is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although Pb was identified as a stressor, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba and Cr were screened from further assessment as discussed in the WAG 8 RI/FS.
OU 8-03-18	No	*COPCs*: Cr
		Contaminated Media: Surface and subsurface soil
S1W Spray Ponds		*HQs:* N/A[a]
		Comment: Cr was screened from further assessment as discussed in the WAG 8 RI/FS.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-03-20	Yes	*COPCs*: Pb
		Contaminated Media: Subsurface soil
AIW Acid Spill		*HQs:* N/A[a]
		Comment: The inclusion of Pb as a COPC is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although Pb was identified as a stressor, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA.
OU 8-03-23	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Pb, Hg, Ag, and Zn) and radionuclides (Cs-137 and Co-60)
		Contaminated Media: Surface and subsurface soil
Sewage Lagoons		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-03-45	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Ag, and Zn)
		Contaminated Media: Surface soil
Incinerator		*HQs:* N/A[a]
		Comment: The inclusion of As and Pb as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As and Hg were identified as two stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-04-65	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Pb, Hg, Ag)
		Contaminated Media: Surface soil
Southeast Corner Oil Spill		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, and Ag were screened from further assessment as discussed in the WAG 8 RI/FS..
OU 8-04-70	No	*COPCs*: Xylenes
		Contaminated Media: Subsurface soil
Boiler House Fuel Oil Release		*HQs:* N/A[a]
		Comment: PAHs were not fully addressed in the SLERA. An additional literature review was performed to address these constituents. PAHs were not found to be pervasive in the source areas at WAG 8. Based on the literature search performed as part of this ERA, PAHs were also found to be no more toxic to the identified ecological receptors than the other contaminants of concern, therefore xylenes were eliminated from further assessment.
OU 8-04-75	No	*COPCs*: Xylenes
		Contaminated Media: Surface and subsurface soil
Fuel Tank Revetments		*HQs:* N/A[a]
		Comment: PAHs were not fully addressed in the SLERA. An additional literature review was performed to address these constituents. PAHs were not found to be pervasive in the source areas at WAG 8. Based on the literature search performed as part of this ERA, PAHs were also found to be no more toxic to the identified ecological receptors than the other contaminants of concern, therefore xylenes were eliminated from further assessment.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-04-77	No	*COPCs*: Xylenes
		Contaminated Media: Surface and subsurface soil
A1W Diesel Tank		*HQs:* N/A[a]
		Comment: PAHs were not fully addressed in the SLERA. An additional literature review was performed to address these constituents. PAHs were not found to be pervasive in the source areas at WAG 8. Based on the literature search performed as part of this ERA, PAHs were also found to be no more toxic to the identified ecological receptors than the other contaminants of concern, therefore xylenes were eliminated from further assessment.
OU 8-05-01	No	*COPCs*: Organic compounds (tetrachloroethylene, and 1,1,1-trichloroethane)
		Contaminated Media: Surface and subsurface soil
Field Area North of S1W		*HQs:* N/A[a]
		Comment: No significant risks were identified for tetrachloroethylene and 1,1,1-trichloroethane and were therefore screened from further consideration.
OU 8-05-51	No	*COPCs*: 1,1,1-trichloroethene
		Contaminated Media: Surface and subsurface soil
West Refuse Pit #4		*HQs:* N/A[a]
		Comment: No significant risks were identified for 1,1,1-trichloroethene and were therefore screened from further consideration.
OU 8-06-53	No	*COPCs*: Organic compounds (acetone, tetrachloroethylene, and 1,1,1-trichloroethane)
		Contaminated Media: Surface and subsurface soil
East Refuse Pits and Trenching Area		*HQs:* N/A[a]
		Comment: No significant risks were identified for acetone, tetrachloroethylene, 1,1,1-trichloroethane and were therefore screened from further consideration.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-07 *Industrial Waste Ditch (IWD)*	Yes	*COPCs*: Metals (As, Ba, Cr, Cu, Pb, Hg, Ag, and Zn), and acetone *Contaminated Media*: Surface and subsurface soils, surface water *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. No significant risks were identified for acetone, and it was therefore screened from further consideration.
OU 8-09 *Interior Industrial Waste Ditch*	Yes	*COPCs*: Metals (As, Ba, Cr, Cu, Pb, Hg, Ag, and Zn), organic compounds (acetone and tetrachloroethylene), and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Surface and subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. Ba, Cr, Cu, Ag, and Zn were eliminated from further assessment as discussed in the WAG 8 RI/FS. No significant risks were identified for acetone and tetrachloroethylene and they were therefore screened from further consideration. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-12b and OU 8-08-14 *SIW Leaching Pit and SIW Leaching Bed*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), organic compounds (acetone and Aroclor-1260), and radionuclides (Cs-137, Co-60, Sr-90, Ni-63, Pu-239, Am-241, U-234, and U-238) *Contaminated Media*: Surface and subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. No significant risks were identified for acetone, and it was therefore screened from further consideration. PAHs were not fully addressed in the SLERA. An additional literature review was performed to address these constituents. PAHs were not found to be pervasive in the source areas at WAG 8. Based on the literature search performed as part of this ERA, PAHs were also found to be no more toxic to the identified ecological receptors than the other contaminants of concern, therefore Aroclor-1260 was eliminated from further assessment. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-02 *Old Ditch Surge Pond*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Pb, Hg, and Ag), and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Surface and shallow subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, and Ag were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-11 *Tile Drain Field*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-12A *Underground Piping to S1W Leaching Pit*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-13 *Temporary Pit*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Pb, Hg, and Ag), and radionuclide (Cs-137 and Co-60) *Contaminated Media*: Subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, and Ag were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-16 *Radiography Building Collection Tanks*	Yes, As, Pb, Hg	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), acetone, and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with exposure to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. No significant risks were identified for acetone, and it was therefore screened from further consideration. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-19 *AIW Leaching Bed*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), and radionuclides (Cs-137, Co-60, Sr-90, Ni-63, Pu-239, Am-241, U-234, and U-238) *Contaminated Media*: Surface and subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-21 *Old Sewage Treatment Plant*	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), and radionuclides (Cs-137 and Co-60) *Contaminated Media*: Surface and subsurface soil *HQs:* N/A[a] *Comment:* The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-32	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn)
		Contaminated Media: Subsurface soil
S5G Basin Sludge Disposal Bed		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS.
OU 8-08-43	Yes	*COPCs*: Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, and Zn), and radionuclides (Cs-137 and Co-60)
		Contaminated Media: Surface and shallow subsurface soil
Seepage Basin Pumpout Area		*HQs:* N/A[a]
		Comment: The inclusion of As, Pb, and Hg as COPCs is the reason for the site's retention in the WAG ERA. The risks associated with the exposures to the ecological receptors are characterized as low. Although As, Pb, and Hg were identified as three stressors, the results of the WAG ERA indicated that no additional actions are required due to estimated risks to ecological receptors, however this site needs to be addressed in the OU 10-04 ERA. Ba, Cd, Cr, Cu, Ag, and Zn were screened from further assessment as discussed in the WAG 8 RI/FS. The radioactive contaminants were also screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-66	No	*COPCs*: Radionuclides (Cs-137 and Co-60)
		Contaminated Media: Shallow subsurface soil
Hot Storage Pit		*HQs:* N/A[a]
		Comment: The radioactive contaminants were screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

Table C2-1-7-1. (continued).

OU/Sites Assessed in the WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 8-08-80	No	*COPCs*: Radionuclides (Cs-137 and Co-60)
		Contaminated Media: Surface and subsurface soil
AIW/SIW Radioactive Line		*HQs:* N/A[a]
		Comment: The radioactive contaminants were screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.
OU 8-08-81	No	*COPCs*: Radionuclides (Cs-137 and Co-60)
		Contaminated Media: Subsurface soil
AIW Processing Building Area Soil		*HQs:* N/A[a]
		Comment: The radioactive contaminants were screened. The risk to ecological receptors due to exposure to radioactive constituents was found to be less than the corresponding human health risk. Therefore, the human health risk values will be used for remedial action decisions and those actions will be protective of the ecological receptors as well.

a. Hazard Quotients were not calculated for the WAG ERA. Screening level hazard quotients were used to screen contaminants from further assessment in the SLERA. The WAG 8 ERA used a qualitative assessment that compared calculated exposure values to laboratory studies. These calculated exposure values for each species and contaminant of concern were compared to NOAELs for related species.

C2-1-7.3 Resolution of WAG 8 Ecological Issues

The SLERA for the WAG 8 ERA identified many of its data gaps as uncertainties. These uncertainties are described below.

1. **No studies were found specific to deer mice, bald eagles, or mallards.** During the ERA, exposure values were calculated for each receptor species and then compared to NOAELs obtained from a literature search that identified studies conducted on other species. No studies were found specific to the three receptor species selected for the WAG 8 ERA. The more taxonomically distant the species, the greater the uncertainty. This uncertainty could either over or under estimate the risk. The comparison of exposure estimates to adverse effect levels included the full range of NOAELs that were found in the literature search. The use of NOAELs is more conservative than the use of the LOAELs that were found in the literature search and would tend to over estimate the risk associated with WAG 8. The studies found in the literature search were primarily laboratory studies and not natural setting studies. The extrapolation of these data to natural settings is another uncertainty that may over estimate the risk.

2. **Detailed Characterization was unavailable.** Although additional sampling for WAG 8 was not identified as a data gap, for most of the individual sites, the maximum concentration for the stressors were used when detailed characterization data was not available. This uncertainty tends to over estimate the risk.

3. **Insufficient toxicology data.** Cumulative impacts due to multiple stressors were not addressed because sufficient toxicology data was not available. This tends to under estimate the risk.

4. **Insufficient Availability of Inhalation and Direct Exposure Assessment Data.** Exposure routes associated with contaminant transport to potential ecological receptors are direct exposure and ingestion of soil, vegetation, and surface water. However, only ingestion exposure to radiation was evaluated due to lack of toxicity values for other pathways in the literature. Also insufficient data currently exist to support assessment of effects to vegetation at the INEEL, however, terrestrial vegetation is not believed to be at risk from the levels of WAG 8 radiological contamination. Surface water was not considered a source based on the results of the Environmental Monitoring Program and the WAG 8 Industrial Waste Ditch RI/FS. This results in possible underestimation of risk.

5. **Unknown Bioavailability, Intake and Absorption Factors for Natural Settings.** Bioavailability, intake and absorption factors, are not well defined for receptors in natural settings. Estimated values were used assuming 100% availability and absorption. Also, since the exact stressor compounds were not known, the more toxic forms of the identified stressors were assumed to be present and tend to over estimate the risk.

In addition to the above WAG 8 data gaps/uncertainties and the incorporation of COPCs in Table C2-1-7-1 into the OU 10-04 ERA, the following actions must be considered before the OU 10-04 ERA is initiated:

- Conduct a biological survey of retained sites within and areas surrounding WAG 8 (see Section D1.5) to support the OU 10-04 ERA. If necessary, record results and conduct a comparison against the retained list of WAG 8 sites and COPCs.

- Compare results of the OU 10-04 ERA to the WAG 8 ecological decisions.

C2-1-8. WAG 9 ERA

A SLERA and WAG ERA have been conducted for WAG 9. The SLERA, which is the first phase of the INEEL ERA process, identified those contaminants present at WAG 9 that have the potential to cause undesirable ecological effects. The WAG ERA, which is the second phase in the INEEL ERA process, provides a site-by-site evaluation of the risks to ecological resources as a result of exposure to radiological and nonradiological contaminants at the WAG level. The sites and contaminants identified as a result of the SLERA, in addition to those sites that had inadequate sampling information to include in the SLERA, were analyzed in the WAG ERA.

C2-1-8.1 Summary of WAG 9 Site Screening

The SLERA phase, which is a "preassessment" or data gap analysis performed at the WAG level to reduce the number of sites and contaminants to be addressed in subsequent assessments. This screening level is used as a preassessment tool to (a) better define the extent and nature of individual WAG sites of contamination, and identify sites where no contaminants of potential concern (COPCs) are found; (b) reduce the number of COPCs to be addressed in the WAG ERA by eliminating those that clearly pose a low likelihood for risk, (c) identify sites for which further data are needed, and (d) identify other data gaps. This screening also helps formulate problems and determine media and pathways to be evaluated for WAG ERA assessments.

The WAG ERA phase in the INEEL ERA process provides a site-by-site evaluation of the risks to ecological resources as a result of exposure to radiological and nonradiological contaminants at the WAG level. The WAG 9 SLERA was conducted to screen sites identified in the FFA/CO (DOE-ID 1991) and to identify those contaminants to be analyzed in the WAG ERA. This assessment was performed using the same basic methodology developed in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessments at the INEL* (VanHorn et al. 1995).

C2-1-8.2 WAG 9 Ecological Risk Assessment

DOE, EPA, and IDHW are currently negotiating with WAG 9 to determine a schedule and options for clean-up of the various ecological sites of concern. Table C2-1-8-1 identifies the sites that pose a potential ecological risk and include the corresponding COPCs and HQs, where available. A total of nine sites subsequently were assessed in the WAG ERA. Generally, sites that had HQs >1.0 were mainly due to metal contamination. Metals that present the greatest potential for adverse effects are: aluminum (HQs >100 and <1,000); barium (HQs >100 and <1,000; chromium(IV) (HQs >100 and <1,000); copper (HQs >100 and <1,000); cyanide (HQs >100 and <1,000); lead (HQs >100 and <1,000); magnesium (HQs >100 and <10,000); mercury (HQs >100 and <1,000); sulfate (HQs >100 and <1,000); vanadium (HQs >100 and <1,000); and zinc (HQs >100 and <1,000). There are three sites that have an HQ greater than 1.0 due to organic contamination; ANL-05 and ANL-3 because of dioxins/furans (HQs >100 and <10,000), and ANL-61A due to PCB contamination (HQs >1). There were no sites that have an HQ greater than 0.1 due to radionuclide contamination.

Although QCEs should be derived from the best available literature and all the uncertainties that could be reasonably accounted for are included in the AFs used to calculated TRVs, it is unlikely that any single scheme could suffice to extrapolate available toxicity data for all chemicals among all species.

Table C2-1-8-1. WAG 9 ERA results.

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
a. OU 9-01	Yes	*COPCs*: PCBs
Site: ANL-61A		*Contaminated Media*: Subsurface soil
PCB spill next to ANL-61		*HQs:* All < target values
		Comment: This site is not listed as a site to be included in the WAG 9 RI/FS (Lee et al. 1997). The WAG ERA shows a concentration >EBSLs for PCBs (Aroclor-1260). However for HQ analysis concentrations were < target values. Therefore, a determination needs to be made whether to screen from further assessment. ANL-61A and contaminants need to be evaluated in the OU 10-04 ERA.
OU 9-01	Yes	*COPCs*: H-3, hydrazine, Na
Site: ANL-62		*Contaminated Media*: Surface and subsurface soil
Sodium Boiler Building (766) Hotwell		*HQs:* No HQs listed in the WAG ERA
		Comment: This site is not listed as a site to be included in the WAG 9 RI/FS (Lee et al. 1997). The WAG ERA states tritium levels were at 10^5 µg/ml, and there is no evidence of migration. Both tritium and hydrazine do not have a listed concentration in the EBSL comparison table or in the HQ analysis table. ANL-62 and contaminants need to be evaluated in the OU 10-04 ERA.
OU 9-01	Yes	*COPCs*: Metals (Al, Sb, As, Ba, Cr^{+3}, Ca, Cu, cyanide, Pb, Mg, Hg, Se, Ag, Na, V, and Zn), and radionuclides (Sr-90 and Cs-137)
Site: ANL-04		*Contaminated Media*: Surface sediment
ANL Sewage Lagoons		*HQs:* Al >1,000 and <10,000, Sb >1 and <10, As >10 and <100, Ba >1,000 and <10,000, Cr^{+3} >10 and <100, Cu >100 and <1,000, cyanide >100 and <1,000, Pb >100 and <1,000, Mg >10 and <100, Hg >100 and <1,000, Se >10 and <100, Ag >10 and <100, Na >10 and <100, V >100 and <1,000, Zn >100 and <1,000
		Comment: Although an HQ was calculated for cyanide, the WAG ERA does not show a concentration in the inorganic screening. Al and Mg have a calculated HQ, but concentrations are < EBSLs. Although the WAG ERA does not list a HQ for Ca, the concentration is > EBSLs. Also HQ analysis states radionuclides were initially screened. However, the WAG ERA states all radionuclides will be retained as part of water ingestion pathway. WAG 9 must address ANL-04 in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider WAG 9 contaminants w/HQ >1.

Table C2-1-8-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 9-01	Yes	*COPCs*: Ag
Site: ANL-29		*Contaminated Media*: Surface and subsurface soil
Industrial Waste Lift Station		*HQs:* Ag >10 and <100
		Comment: This site is not listed as a site to be addressed in the WAG 9 RI/FS (Lee et al. 1997) although HQ >1 for Ag. ANL-29 and contaminants need to be evaluated in the OU 10-04 ERA.
OU 9-01	Yes	*COPCs*: Ag
Site: ANL-36		*Contaminated Media*: Surface and subsurface soil
TREAT Photo Processing Discharge Ditch		*HQs:* Ag >1 and <10
		Comment: This site is not listed as a site to be addressed in the WAG 9 RI/FS (Lee et al. 1997) although HQ >1 for Ag. ANL-36 and contaminants need to be evaluated in the OU 10-04 ERA.
OU 9-03	Yes	*COPCs*: Metals (Ca and Na), radionuclides, VOCs, PAHs, and dioxin/furans
Site: ANL-05		*Contaminated Media*: Surface and subsurface soil
ANL Open Burn Pits #1, #2, #3		*HQs:* Na >10 and <100
		Comment: Although no HQ calculated for Ca, concentration >EBSLs. WAG 9 must address ANL-05 in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1. Cs-137, Sr-90, aluminum, barium, beryllium cadmium, Cr^{+3}, Cr^{+6}, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, silver, vanadium, and zinc were all screened based on concentrations <EBSLs or background.

Table C2-1-8-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 9-04 Site: ANL-01 *Industrial Waste Pond and Cooling Tower Blowdown Ditches (3)*	Yes,	*COPCs*: Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cl, Cr^{+3}, Cr^{+6}, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, and Zn), cyanide, sulfate, radionuclides, VOCs, and herbicides *Contaminated Media*: Surface and subsurface soil, sediment, and surface water *HQs:* Al >1,000 and <10,000, Sb >1 and <10, As >10 and <100, Ba >10,000, Be >1 and <10, Cd >1,000 and < 10,000, Cl >1 and <10, Cr^{+3} >1,000 and <10,000, Cr^{+6} >100 and <1,000, Cu >10 and <100, Pb >10 and <100, Mg >10,000, Mn >10 and <100, Hg >100 and <1,000, Ni >10 and <100, Se >10 and <100, Ag >10 and <100, Na >1 and <10, Tl >1 and <10, V >100 and <1,000, Zn >100 and <1,000, cyanide >10 and <100, sulfate >100 and <1,000. *Comment:* Although no HQs were listed in the WAG ERA for Ca, Fe, and K, concentrations were > EBSLs. Listed contaminants should be included in the OU 10-04 ERA and in the WAG 9 remedial action programs. WAG 9 must address ANL-01 in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQs >1. VOCs were screened based on concentrations <EBSLs or background.
OU 9-04 Site: ANL-01A *Main Cooling Tower Blowdown Ditch*	Yes	*COPCs*: Metals (Sb, As, Ba, Be, Cd, Cr^{+3}, Cr^{+6}, Co, Cu, cyanide, Fe, Pb, Mn, Hg, Ni, Se, Ag, Na, V, and Zn), radionuclides, and SVOCs *Contaminated Media*: Surface and subsurface soil *HQs:* Sb >1 and <10, As >10 and <100, Ba >1,000 and <10,000, Cr^{+3} >10 and <100, Cr^{+6} >1 and <10, Co >1 and <10, Cu >10 and <100, cyanide >10 and <100, Pb >100 and <1,000, Mn >10 and <100, Hg >100 and <1,000, Ni >100 and <1,000, Se >1 and <10, Ag >1 and <10, Na >1 and <10, V >100 and <1000 *Comment:* No HQs were listed for Be, Cd, Fe, or Zn in the WAG ERA, however concentrations >EBSLs. Listed contaminants should be included in the OU 10-04 ERA and in the WAG 9 remedial action programs. WAG 9 must address ANL-01A in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.
OU 9-04 Site: ANL-09 *ANL Interceptor Canal*	Yes	*COPCs*: Metals (As, Ca, Cu, Pb, and Hg) and radionuclides *Contaminated Media*: Surface and subsurface soil *HQs:* As >10 and <100, Cu >1 and <10, Pb >10 and <100, Hg >10 and <100 *Comment:* Although no HQ was provided for Ca, concentration was <EBSLs. Listed contaminants should be included in the OU 10-04 ERA and in the WAG 9 remedial action programs. WAG 9 must address ANL-01A in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQ >1.

Table C2-1-8-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
b. OU 9-04 Site: ANL-35 *Industrial Waste Lift Station Discharge Ditch*	Yes,	*COPCs*: Metals (Al, As, Ba, Be, Cd, Cr^{+3}, Cu, Pb, Mg, Mn, Hg, Ni, Se, Ag, Na, Tl, V, and Zn), cyanide, sulfate, radionuclides, VOCs, and dioxin/furans (HpCDD, OCDD) *Contaminated Media*: Surface and subsurface soil, and surface water *HQs:* Al >1,000 and <10,000, As >10 and <100, Ba >1,000 and <10,000, Be >1 and <10, Cd >100 and >1,000, Cr^{+3} >1 and <10, Cu >10 and <100, Pb >10 and <100, Mg >1,000 and <10,000, Mn >100 and <1,000, Hg >10 and <100, Ni >10 and <100, Se >1 and <10, Ag >100 and <1,000, Na >1 and <10, sulfate >1 and <10, Tl >1 and <10, V >100 and <1,000, Zn >10 and <100; cyanide >10 and <100, HpCDD >1 and <10, and OCDD >1 and <10, *Comment:* No HQs were listed for PeCDD, Ca, Cl, fluoride, Fe, and K, however concentrations were >EBSLs. WAG 9 must address ANL-01A in its clean-up decision (i.e., monitoring, clean-up). OU 10-04 ERA needs to consider INEEL contaminants w/HQs >1.

Thus, the remaining uncertainty in these criteria may be even greater than that associated with exposure estimation. Significant sources of errors from the TRVs are as follows:

- While classical human toxicology relies on extrapolating toxicity data from a handful of mammalian species to one species, an ecotoxicological evaluation must rely on extrapolation from a few test species to a larger number of receptor species spanning variable (and often large) ranges of phylogeny, anatomy, physiology, and life histories. Further, the spatial and temporal heterogeneity of exposure and conditions in natural systems can cause large variations in the doses and responses observed.

- Organisms in the environment are rarely (if ever) exposed to pure compounds alone, but rather to complex mixtures of chemicals for which the synergistic effects are unknown.

- Chemicals may be volatilized, and transformed to more or less toxic products sequestered in the environment.

C2-1-8.3 Status of WAG 9 Ecological Investigation

The Agencies are currently negotiating the ecological clean-up levels. DOE originally proposed an action level for sites in which a contaminant had an HQ >100. However, the State of Idaho, concerned about the accumulation of contaminants within a species, proposed an action level to be lowered to contaminants with an HQ >10. Using the lower action level, the 9 sites of concern have been reduced to 6 sites of concern. Of the three sites eliminated, two of the sites listed silver as a contaminant of concern and one site listed sodium as a contaminant of concern. The two silver sites were below WAG 9's background concentration for silver. WAG 9 devised its own background concentration because a concentration level has not yet been developed for the INEEL. The site with sodium was screened out although the sodium concentration was slightly above a HQ of 10. The justification for the elimination is that sodium is a nutrient required for ecological receptors and there are no major toxicological effects that occur to a species at sodium concentrations above 10 times the background concentration, rather, these effects are noticed at a concentration below 100 times the background concentration.

WAG 9 proposes to remediate the 6 remaining sites of concern. The preferred alternative for remediation is phytoremediation. A bench and laboratory scale test will occur in FY-98 to select a plant species that sufficiently absorbs inorganics and organics. Radiological contaminants are not a concern because no sites of concern remain that have radionuclides above levels of concern. If no plant species meets the objectives desired for remediation, then excavation of the soils is the proposed alternative remedy. Excavation of soils would occur in FY-99 when a soils repository is anticipated to be opened at the INEEL allowing for the disposal of contaminated soils. Another option that is being considered is soil washing to separate contaminated soils from clean soils, thus reducing the amount of soils disposed in the INEEL soils repository. A soil washing bench scale experiment will occur in FY-98 also to determine the sufficiency of this option.

If phytoremediation proves to be a viable option, it is desired that a plant species be selected that has a minimum of two growing seasons: one occurring in FY-98 the other in FY-99. The harvested plant would be dried, baled, and stored only briefly prior to being sent to the Waste Experimental Reduction Facility (WERF) for incineration. The remaining ash would then be sent to the soil repository in FY-99. Note that if a plant is selected that is not a native to the INEEL, it will be harvested before it goes to seed, thus preventing the spread of non-native plant species across the INEEL.

C2-1-9. WAGS 6 AND 10 ERA

It is important to understand that the INEEL-site wide ERA will be conducted as part of OU 10-04 comprehensive investigation. This investigation also will include the ERA results conducted on WAGs 6 and 10 sites. Appendix C1 contains an ecological screening and data gap analysis to identify sites with known contamination potentially above risk-based levels, and identify sites for which known or potential data gaps associated with the release sites have been identified. This analysis identified a total of 18 sites of concern for ecological data gaps in WAGs 6 and 10. Eleven of the sites are part of WAG 6, and the remaining 7 sites are part of WAG 10. These sites will be included in both the OU 10-04 ERA and the OU 10-04 WAG ERA.

C2-1-9.1 Summary of WAGs 6 and 10 Site Screening

The following site screening process was used to identify the WAGs 6 and 10 release sites to be included in the OU 10-04 ecological assessment.

1. Compilation of contaminant sampling information for all WAGs 6 and 10 release sites. Information and data for the WAGs 6 and 10 release sites provided the input for the SDGA site screening and the data gap analysis.

2. Elimination of sites with no contamination source at any depth. This step eliminated sites with no source of contamination, and sites from which all contamination has been removed by interim action.

3. Elimination of sites with contamination only at depths greater than 3 m (10 ft) below ground. This step eliminated sites with a source of contamination limited to depths greater than 3 m (10 ft) belowground. For the OU 10-04 RI/FS, the assumption will be made that contamination buried more deeply than 3 m (10 ft) below ground is inaccessible to ecological receptors.

4. Elimination of sites with contaminants only at concentrations lower than background concentrations identified in INEEL background guidance (Rood, Harris, White 1996). This step eliminated sites that contain only naturally occurring contamination. Only anthropogenic sources of contamination that exceed INEEL background concentrations (Rood, Harris, White 1996) will be evaluated in the OU 10-04 RI/FS. Retention of sites containing known contamination, or known data gaps, for further evaluation against the contaminant screening criteria. The last step of the ecological site screening process was to identify the sites that are retained for further evaluation in the ecological contaminant screening process. The contaminant screening evaluation will be present in the OU 10-04 RI/BRA. The evaluation is not presented in the OU 10-04 RI/FS Work Plan because more sampling data will be collected at some of the WAGs 6 and 10 release sites as part of the OU 10-04 RI/FS field investigations.

C2-1-9.2 WAGs 6 and 10 Ecological Risk Assessment

Because the WAG ERA has not yet been performed for WAGs 6 and 10, no EBSL or background comparisons have been completed and no HQs have been calculated. Table C2-1-9-1 provides a listing of sites to be included in the WAG and OU 10-04 ERAs.

C2-1-9.3 Status of WAGs 6 and 10 Ecological Investigations

The screening has been completed for WAGs 6 and 10. Results of this screening will be presented in the OU 10-04 comprehensive work plan and in Table C2-1-9-1. The work plan will also contain the results of the other WAG ecological investigations as presented in this report, to support the OU 10-04 ERA. The work plan will become final in FY-98. The WAGs 6 and 10 WAG ERA will be initiated in FY-98 and results will be incorporated into the INEEL-ERA which is scheduled for completion in FY-99.

Because the OU 10-04 ERA approach is dependent on analysis results from WAG-specific screening level ERAs and WAG ERAs, timely completion of these reports are critical to the success of the OU 10-04 ERA and ROD. Critical assumptions and programmatic risks are identified in Section 8 of the *Technical Memorandum for the Ecological Risk Assessment Approach Document* (INEL 1996).

Table C2-1-9-1. WAG 10 and 6 ERA results.

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU, None	NA[a]	*COPCs*: Radionuclides
Site: EBR-1		*Contaminated Media*: Building and subsurface soil
Experimental Breeder Reactor I (EBR-I) Reactor Building		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-01	NA[a]	*COPCs*: None listed in *Ecological Screening and Comment and Analysis Report.*
Site: BORAX-02		*Contaminated Media*: Surface and subsurface soil
Boiling Water Reactor Experiment (BORAX) I burial site		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-02	NA[a]	*COPCs*: Radionuclides
Site: BORAX-01		*Contaminated Media*: Subsurface soil
BORAX II through V leach pond		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-02	NA[a]	*COPCs*: Cs-137
Site: BORAX-08		*Contaminated Media*: Subsurface soil
BORAX V ditch		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.

Table C2-1-9-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 6-02	NA[a]	*COPCs*: Radionuclides, metals, and VOCs
Site: BORAX-09		*Contaminated Media*: Building, surface, and subsurface soil
BORAX II through V Reactor Building		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-03	NA[a]	*COPCs*: TPH
Site: EBR-08		*Contaminated Media*: Subsurface soil
EBR-1 (WMO-703) fuel oil tank		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-03	NA[a]	*COPCs*: Metals
Site: EBR-09		*Contaminated Media*: Subsurface soil
EBR-I (WMO-704) fuel oil tank at WMO-601		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-03	NA[a]	*COPCs*: TPH
Site: EBR-10		*Contaminated Media*: Subsurface soil
EBR-I (WMO-705) gasoline tank		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.

Table C2-1-9-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 6-03	NA[a]	*COPCs*: TPH
Site: EBR-11		*Contaminated Media*: Subsurface soil
EBR-I fuel oil tank (EBR-706)		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-03	NA[a]	*COPCs*: TPH
Site: EBR-12		*Contaminated Media*: Subsurface soil
EBR-I diesel tank (EBR-707)		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 6-04	NA[a]	*COPCs*: Radionuclides
Site: EBR-15		*Contaminated Media*: Surface and subsurface soil
Radioactive soil contamination (EBR-I)		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU – None	NA[a]	*COPCs*: Asbestos, Pb
Site: EOCR-03		*Contaminated Media*: Surface and subsurface soil
Experimental Organic-Cooled Reactor (EOCR) oxidation pond		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.

Table C2-1-9-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 10-01	NA[a]	*COPCs*: Radionuclides and metals
Site: LCCDA-01		*Contaminated Media*: Surface and subsurface soil
Liquid Corrosive Chemical Disposal Area (LCCDA) Old Disposal Pit (west end)		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 10-01	NA[a]	*COPCs*: Metals
Site: LCCDA-02		*Contaminated Media*: Surface and subsurface soil
LCCDA Limestone Treatment and Disposal Pit (east end)		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 10-02	NA[a]	*COPCs*: Radionuclides and organic materials
Site: OMRE-01		*Contaminated Media*: Surface and subsurface soil
Organic-Moderated Reactor Experiment (OMRE) leach pond		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 10-03	NA[a]	*COPCs*: Ordnance
		Contaminated Media: Surface soil
Ordnance areas (including Naval Ordnance Disposal Area (NODA)]		*HQs:* NA[b]
		Comment: No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.

Table C2-1-9-1. (continued).

Sites Assessed in WAG ERA	Identified as a WAG ERA Site of Concern? Y/N	Description
OU 10-04 *WAG 10 Comprehensive Snake River Aquifer RI/FS*	NA[a]	*COPCs*: Radionuclides, metals, and VOCs *Contaminated Media*: Ground water *HQs:* NA[b] *Comment:* No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.
OU 10-05 *Ordnance Interim Action*	NA[a]	*COPCs*: Ordnance *Contaminated Media*: Surface soil *HQs:* NA[b] *Comment:* No EBSL or background comparison completed. No HQ analysis conducted. Contaminants and site needs to be considered in both the OU 10-04 ERA and the OU 10-04 WAG ERA. This site is included in the OU 10-04 ERA and site is also considered in WAG 10/6 cleanup decision.

a. A WAG ERA will be conducted for WAG 10/6 in FY-99. Results of the WAG ERA will be included in the OU 10-04 ERA conducted as part of the OU 10-04 RI/FS.

b. No HQs calculated.

C2-1-10. REFERENCES

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